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CONCHOLOGISTS OF AMERICA, INC.

In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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In This Issue

Edotor's comments: In *American Conchologist* Supplement 1, Jan 2017, an earlier draft version of the caption for the back cover was inadvertently used. Here is the corrected caption with the changes in **bold**.

Back cover: Some of the 36 marine molluscan species banned from collection, possession, or trade in the Philippines (see: p. 12 and http://www.conchology.be/?t=1000). Names (as listed by Philippine authorities) left to right: top row - *Amusium obliteratum*, *Barnea manilensis*, *Bolma girgylus*, *Cypraea aurantium*, *Cypraea beckii*. Second row - *Cypraea childreni*, *Cypraea guttata*, *Cypraea katsuae*, *Cypraea leucodon*, *Cypraea mariae*. Third row - *Cypraea martini*, *Cypraea porteri*, *Cypraea saulae*, *Cypraea teramachii*, *Cypraea valentia*. **Forth row** - *Cypraecassis rufa*, *Hippopus hippopus*, *Malluvium lissum*, *Morum grande*, *Morum kurzi*. **Fifth row - *Phalium coronadoi wyvillei***, *Phalium glabratum*, *Phenacovolva dancei*, *Strombus thersites*, *Tibia martini*, *Tridacna crocea*. **Sixth row** - *Tridacna gigas*, *Tridacna maxima*, *Trochus niloticus*, *Turbo marmoratus*, *Varicospira crispata*. Not shown are *Clypeomorus adunca*, *Eufistulina mumiae*, *Separatista blainvilleana*, and *Tridacna squamosa*. Images from femorale.com and the editor.

Register now for the 2017 Key West COA Convention

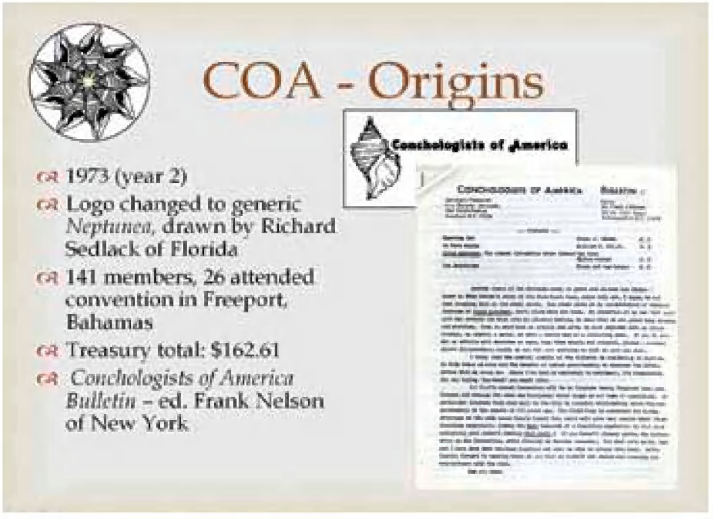
The COA convention is really the place to immerse yourself in all things conchological. Old friends, new friends, educational presentations, exciting auctions, and a bourse with shells from around the world – some priced for pocket change, others for more than your car. Registrations forms online at: conchologistsofamerica.org

Front cover: *Calpurnus verrucosus* (Linnaeus, 1758), approximately 25mm, photographed at night on reef sand, Ambon, Indonesia, 2016, by Charles Rawlings. Collectors are more accustomed to this ovulid shell as it appears here.

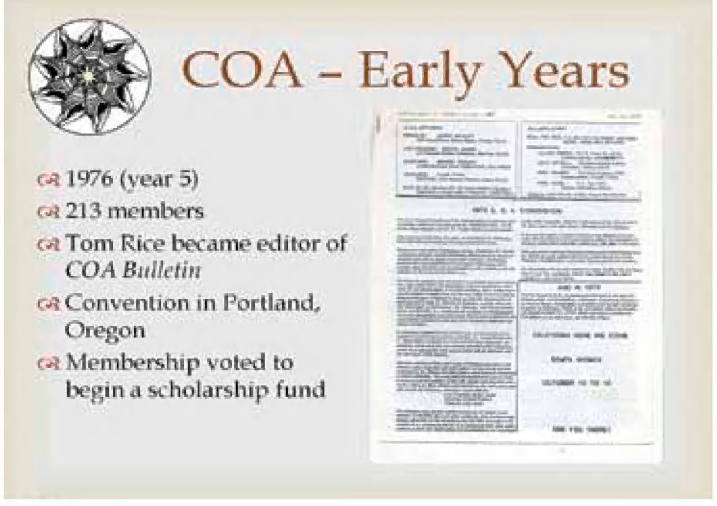
Back cover: *Conus vittatus* Hwass in Bruguière, 1792, photographed in 2016 during a night dive off Isla San Jose, Pacific Panama, by COA member Charles Rawlings. This species occurs from southern Baja California, south to northern Peru. While relatively common, the majority of specimens available to the collector are colored in various shades of brown. The red coloration is uncommon.

Conchologists of America: 45 years old

1. Traditional "amateur activities" such as collecting, exchanging, and travelogue-type presentations were originally at the forefront of the American Malacological Union (AMU, founded in 1931), now the American Malacological Society (AMS), but an increasing focus on academic science over the decades generated dissatisfaction in many members. In 1972, eight enthusiastic shell collectors met in Newport Inn, Rhode Island, at the invitation of John Paduano. This small group founded Conchologists of America, emphasizing all of the things that AMS seemed to have abandoned, including a constitutionally mandated "emphasis … on CONCHOLOGY rather than Malacology." Dues were set at $2 and the queen conch, *Strombus gigas* Linnaeus, 1758 (now *Lobatus gigas*), was chosen for the organization's logo. Bette Rachlin was chosen as president. Some of you may recognize a young and bearded Bob Janowsky in the middle.

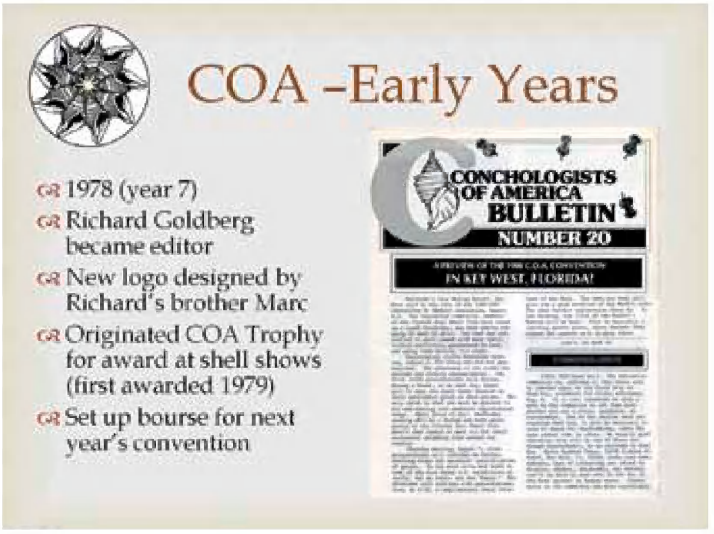


2. By the second year, 1973, the logo had been changed to a generic *Neptunea*, there was $162.61 in the treasury, and a total of 141 members. The convention was originally scheduled on a cruise ship, but it blew up and 26 members then attended the new convention site in Freeport, Bahamas. It was here that the constitution and by-laws were accepted, dues were increased to $3 a year, and the members decided the organization would publish the *Conchologists of America Bulletin*. The first editor was Frank Nelson of New York. He set the guidelines that there would be no poems, no shell craft articles, and no naming of new species. The first COA shell auction was held, bringing in $185.50.

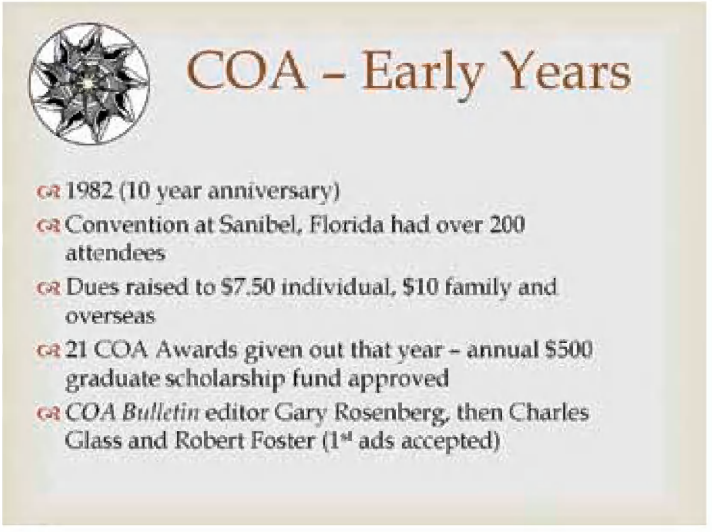


3. In the fifth year, 1976, membership increased to 213 and the convention was held in Portland, Oregon. The annual shell auction earned $839.25 in 1974, $680.50 in 1975, and $1,100 in 1976. Members voted to establish a scholarship fund (note: not a grant fund for research) using excess COA funds as available. The new COA logo first appeared in *COA Bulletin* number six. At the end of the year, Frank Nelson resigned as editor and Tom Rice picked up the job. Keep in mind he was also putting out *Of Sea And Shore*, a solo operation.

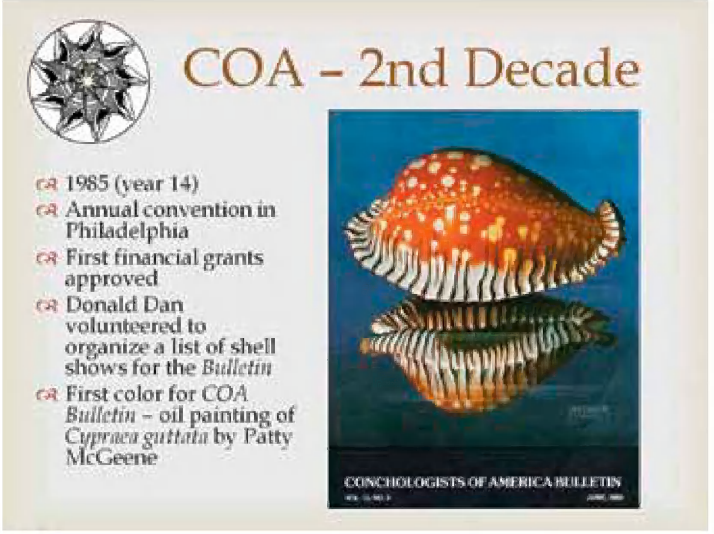
4. Two years later, 1978, Richard Goldberg became editor and had his brother Marc design a new logo for the *COA Bulletin*. The convention was held on Long Island, New York, and members (now totaling 280 with 57 attending the convention) voted to establish a COA Trophy to be presented at shell shows. The award originally came with a gift certificate for shells, books, or shell magazine subscriptions, but this feature was later dropped. Attending shell dealers had been selling and trading shells from their rooms, but Marty Gill did not have a room that year, so he set up in the hotel lobby. Richard Goldberg and Phil Clover soon followed suit. This proved extremely popular with the members and Marty Lerner proposed setting up a separate room just for shell sales. The COA bourse was born.

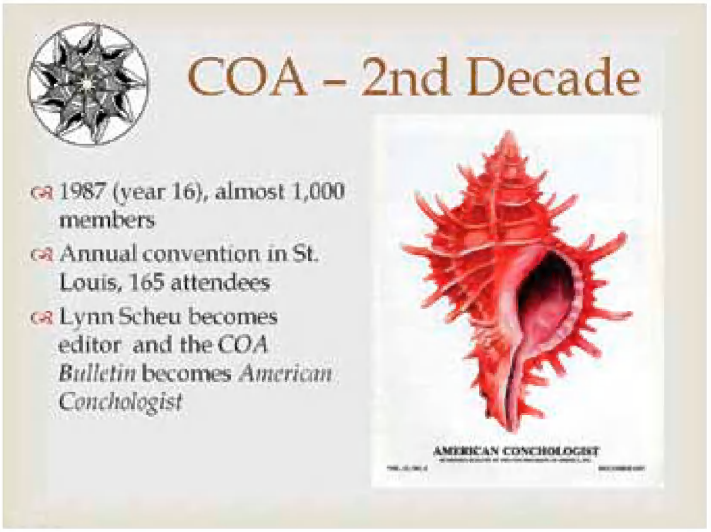


5. COA's ten-year anniversary was 1982 and the annual convention was held on Sanibel Island, Florida. Over 200 members attended, dues were increased, and a $500 scholarship was approved for that year. The annual auction brought in $2,663. There were 21 COA Awards given out in 1982. Gary Rosenberg served as editor of the *COA Bulletin* for a single issue and then the job was picked up by Charles Glass and Robert Foster. They changed to a 'volume and issue number' for the publication and accepted the first ads.

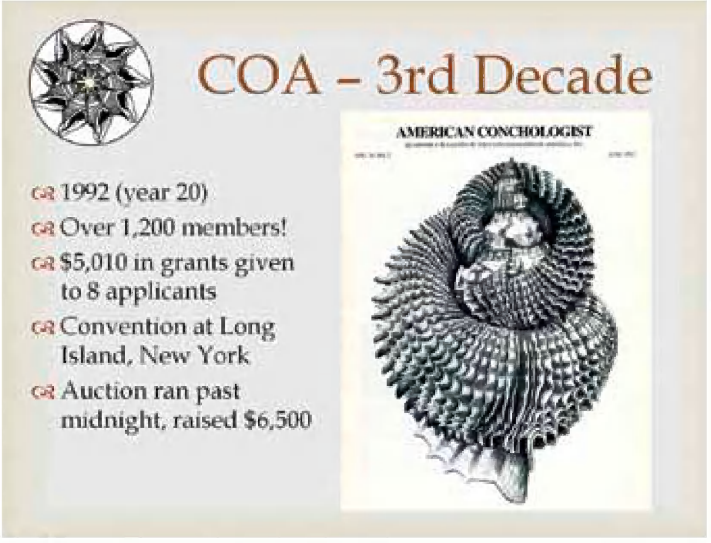


6. The year 1985 is of note for a number of reasons. The convention was held in Philadelphia, Pennsylvania (helping celebrate the Philadelphia Shell Club's 30th anniversary), and the first financial grants for molluscan-related research were approved. There were now over two dozen shell clubs as members of COA and keeping track of the various shell shows was becoming difficult. The answer? Find someone to tackle the difficult and thankless task of tracking the shell show schedule and providing same for publication in the *COA Bulletin*. Donald Dan volunteered for this onerous task and he has done it ever since. This year was also the first use of color in the *COA Bulletin*, a reproduction of an oil painting of *Cypraea guttata* Gmelin, 1791 (now *Perisserosa guttata*), by Patty McGeene.

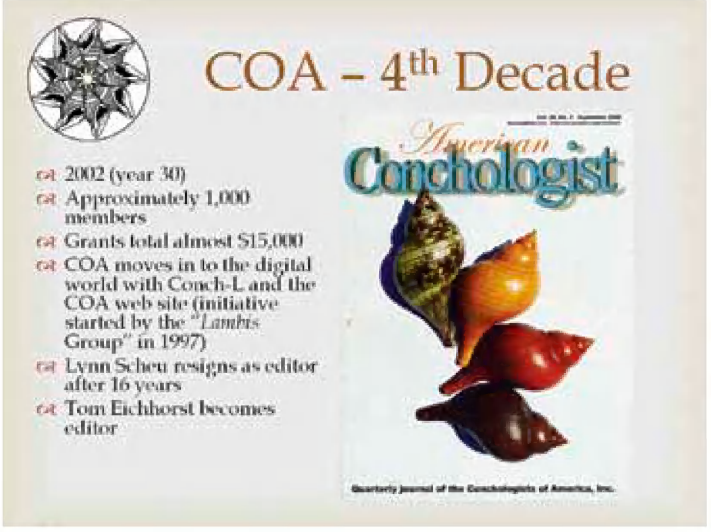




7. Two years later and COA was up to almost 1,000 members. The 1987 convention was held in St. Louis, Missouri, with 165 attendees. Dues had been increased the previous year and the annual auction continued to boost COA funds. Three grants were awarded. Charles Glass and Robert Foster had polished the *COA Bulletin* into a quality publication, but were ready to quit. In stepped Lynn Scheu, who then served as editor for the next 16 years! She also (not without some heated discussion) changed the name to *American Conchologist*.



8. The 20th anniversary convention of COA in 1992 was held on Long Island, New York. COA had finally topped the 1,000 membership level (actually done in 1989) and grant monies totaled $5,010 for eight applicants. The auction that year ran until well past midnight and brought in $6,500. The cover art on the June 1992 issue is by John Timmerman and one can see some relationship between this style and the present COA logo (created by John in 1995). At the end of this decade, Lynn Scheu upgraded our publication from a quarterly bulletin to a quarterly journal.



9. The 30th anniversary convention was in Sarasota, Florida, in 2002. There were approximately 1,000 members and the grant monies were approaching $15,000 per year. COA was now into the digital world thanks to the *Lambis* Group (Linda Brunner, John Caldera, Amy Edwards, Richard Goldberg, Gary Rosenberg, Lynn Scheu, and Debbie Wills). These folks cranked up Conch-L and the COA web site in 1997. This was accomplished despite some strong and stubborn opposition. By the 2002 convention, both of these "computer nonsense" programs were established and growing aspects of COA. Also this year Lynn Scheu stepped down as editor. Tom Eichhorst of New Mexico (a well-known shelling state) became the new editor.

10. The 40th anniversary COA convention in 2012 was held in Philadelphia, Pennsylvania, in conjunction with the annual AMS convention. COA membership was about 800 (our membership average age increased while member numbers declined) and research grants of $15,000 had been given each year for the past decade. Conch-L and the COA web site were firmly established and mature aspects of COA, but the organization faced challenges of declining membership and lack of club sponsors for annual conventions. The annual conventions of COA served a number of functions through the years, but maybe the most important was social networking. Even though the modern digital information age has made such networking possible from the palm of your hand with real-time links around the globe, the COA convention remains a key event. Thankfully, Anne Joffe stepped into the role of convention coordinator and ensured the smooth running of each convention as well as scheduling future conventions.

11. The 45th anniversary COA convention in 2017 is in Key West, Florida. Our membership is just under 800 while our research grants now total more than $20,000 each year. Today's COA is a vibrant organization dedicated to shell collecting, molluscan knowledge and research, and conservation. We still face the dual concerns of aging membership and declining membership rolls. Additionally, there continue to be issues with shelling restrictions as well as varied interpretations and applications of import and export regulations. So if you think there were changes in the last 45 years, just wait to see what happens in the next 45.

COA annual conventions

1972 – Rhode Island
1973 – Bahamas
1974 – Seattle, Washington
1975 – Virginea Beach, Virginea
1976 – Portland, Oregon
1977 – Fort Lauderdale, Florida
1978 – Long Island, New York
1979 – Santa Monica, California
1980 – Key West, Florida
1981 – San Francisco, California
1982 – Sanibel Island, Florida
1983 – Sarasota, Florida
1984 – St. Petersburg, Florida
1985 – Philadelphia, Pennsylvania
1986 – Fort Lauderdale, Florida
1987 – St. Louis, Missouri
1988 – Fort Myers, Florida
1989 – San Diego, California
1990 – Melbourne, Florida
1991 – Long Island, New York
1992 – Jacksonville, Florida
1993 – Panama City, Florida
1994 – Corpus Christi, Texas
1995 – San Diego, California
1996 – St. Petersburg, Florida
1997 – Captiva Island, Florida
1998 – Orlando, Florida
1999 – Louisville, Kentucky
2000 – Houston, Texas
2001 – Port Canaveral, Florida
2002 – Sarasota, Florida
2003 – Tacoma, Washington
2004 – Tampa, Florida
2005 – Punta Rassa, Florida
2006 – Mobile, Alabama
2007 – Portland, Oregon
2008 – San Antonio, Texas
2009 – Clearwater, Florida
2010 – Boston, Massachusetts
2011 – Cape Canaveral, Florida
2012 – Philadelphia, Pennsylvania
2013 – Sarasota, Florida
2014 – Wilmington, North Carolina
2015 – Weston, Florida
2016 – Chicago, Illinois
2017 – Key West, Florida

The history of a shell: *Phenacovolva lenoreae*

Jerry G. Walls

When collectors see the scientific name of a shell, they tend to think of it as just two Latinized words, sometimes followed by the name of the author and the date the shell was described. The name appears to be just a name – a handle with which to hold the idea of what makes that particular shell different from the next one in the drawer. Names are much more than that, however, and every shell, no matter how insignificant or expensive, has a history behind its name. Some histories are more interesting than others – some are simple, and some are complex. One such relatively complex history applies to a little false cowry (Ovulidae) I described some 35+ years ago, *Phenacovolva (Subsimnia) lenoreae* Cardin & Walls.

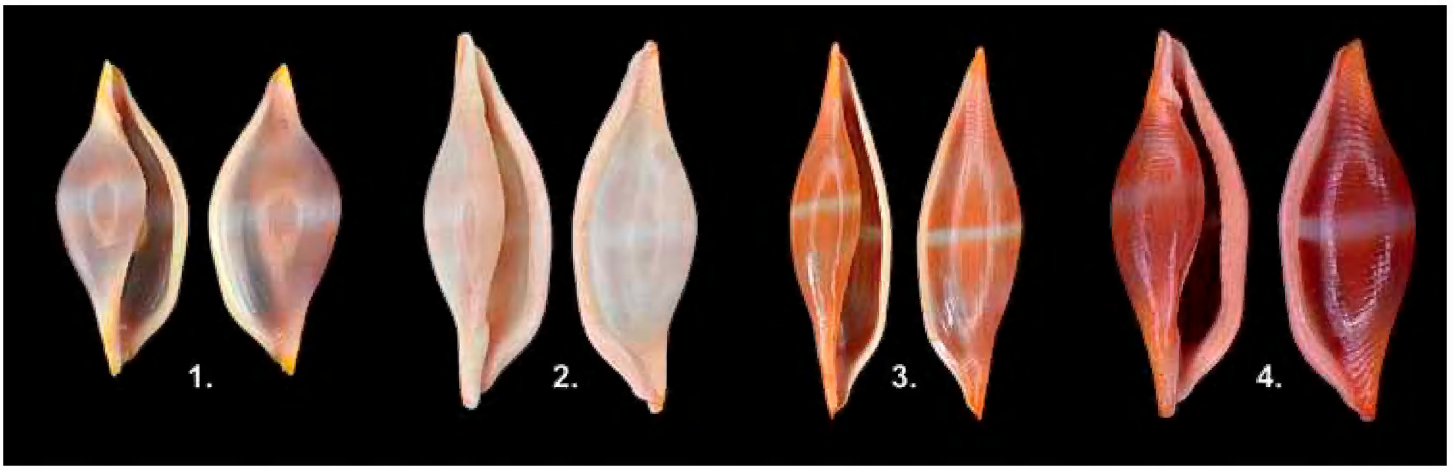
***Phenacovolva* (*Subsimnia*) *lenoreae* Cardin & Walls, 1980 16mm, Ecuador. Image courtesy of Femorale (www.femorale.com).**

History

When I started working on my cone shell book (Walls, 1979), I also started self-publishing a little journal called *The Pariah*. Primitive by today's standards, *The Pariah* served its purpose of allowing me to briefly describe and validate new species of cones before publication of my book, which seemed to be continually delayed. All the new species described in the journal are cones except for one false cowry.

Early in 1980, Charles Cardin, a collector and dealer friend who had been helping me with specimens for the cone book and other things, sent me a handful (32 beached specimens) of a colorful little false cowry that had been sent to him by Terry Hammes from the Perlas Islands, Pacific Panama. Charles was interested in false cowries and thought the species was new, but he wanted a quick description (remember — dealers sell shells, and to sell a shell you need a name) and wasn't that familiar with descriptive procedures. Thus *The Pariah* came to mind. The shells looked new to me, too, so I agreed to coauthor a description, with the species to be named for Charles's daughter, Lenore Jannette Cardin. No problem, I was closing down *The Pariah* anyway, because the cone book was published, so it wouldn't hurt to have just one more description in it. I provided the description, comparisons, and publication; Charles provided the specimens. The holotype went to the Delaware Museum; I kept a couple of paratypes that were later given to a Dutch museum, and Charles kept the rest, which I assume eventually were sold. Story finished.

Not quite. A couple of years later, Bertsch and Bibbey (1982) described a new (and quite different) false cowry from Pacific Panama also collected by Terry Hammes, *Xandarovula hammesi*. At the end of the paper is the mention of the first eastern Pacific record of the wide-ranging Indo-Pacific false cowry, *Phenacovolva brevirostris* Schumacher, from western Panama, based on an identification by Bill Old of the American Museum. The photo of this specimen that appears in the paper is definitely *Phenacovolva lenoreae*. A paragraph obviously inserted into the paper at the last minute mentions that the relationship between *P. brevirostris*



The variable and wide-ranging Indo-Pacific *Phenacovolva brevirostris* (Schumacher, 1817), 16-25mm, mistaken for *Phenacovolva lenoreae* by Bertsch and Bibbey (1982). Specimens 1-2 are from the Philippines. Specimens 3-4 are from Japan. Images courtesy of Femorale (www.femorale.com).

***Phenacovolva lenoreae*, 16-20mm, specimens 1-4 are all from Ecuador, show little variablity, and are readily distinquishable from, although similar to, *Phenacovolva brevirostris*. Images courtesy of Femorale (www.femorale.com).**

and *P. lenoreae* should be examined further. The original description of *P. lenoreae* is not cited, which makes me think the authors had not seen it.

As far as I can tell, *P. lenoreae* is barely mentioned in the scientific literature again for over 30 years (Liltved, 1989, does mention the *P. brevirostris* misidentification), though it is a fairly expensive staple on the lists of several dealers around the world. Almost all specimens sold today come from Ecuador, live-taken material said to be from over 20 meters depth, so the range appears to be restricted to the area between Pacific Panama and Ecuador. The host soft coral, gorgonian, or sea fan, is not recorded in the literature and I've not seen a photo of a living animal. To the best of my knowledge, there has been no molecular genetics or anatomical work on the species — the same as could be said for over 90% of all described gastropods.

Relationships

Now the problems begin. When I described *P. lenoreae*, almost all the literature available was based on Crawford Cate's 1973 revision of the family Ovulidae and his many papers describing new genera and species. Any careful reading of Cate's work indicated that he was oversplitting the species and genera of the family, perhaps because most of his descriptions were based on single specimens often from uncertain localities. His 1975 key to the genera made things even worse, as it was impossible to assign almost any unknown specimen to the correct genus. These shells are much more variable than Cate ever thought, and the "generic" characters are at best vague and misleading. In the original description of *P. lenoreae*, I had suggested that the closest relationships of the species might lie not with *P. brevirostris*, an obvious choice from the Indo-Pacific, but instead with the poorly known *Neosimnia bella-maris* Berry, 1946, from the entrance to San Diego Bay, California. Cate (1969 and 1973) published photos of the holotype and referred specimens of that species, and there were considerable similarities between the two species, though the posterior terminals and the sculpture as well as the coloration were obviously different.

***Simnia barbarensis* (Dall, 1892), 26mm and *Simnia loebbeckeana* (Weinkauff, 1881), 15mm, are both found off California. Both are valid species now considered senior synonyms (in part) for *Neosimnia bellamaris* Berry, 1946 (*nomen dubium*), a species determined to be unrecognizable by Lorenz and Fehse (2009). Images from Wikipedia.com**

I was thus not exactly surprised when a recent visit to WoRMS (World Register of Marine Species, www.marinespecies.org) presented *P. lenoreae* as a valid species with *N. bellamaris* (the currently corrected spelling) listed as a *nomen dubium* (doubtful species) in its synonymy. This action perhaps comes from the treatment of the two species in the fantastic ovulid book by Lorenz and Fehse (2009), where Berry's *bellamaris* is considered to be unrecognizable and based on an eroded specimen. Actually, work by McLean in McLean and Gosliner (1996) presents enough evidence to show that *bellamaris* almost certainly is an uncomfortably close relative of *Simnia loebbeckeana* Weinkauff or *Simnia barbarensis* Dall, both from southern California, as is *bellamaris*. Berry's *bellamaris* has even been officially synonymized with *Simnia loebbeckeana* (a species that appears quite distinct from *P. lenoreae*) by Dolin and Ledon (2002), so that should end that part of the problem — but it probably won't.

[As an aside, try to basically ignore the various generic assignments — *Simnia, Neosimnia, Subsimnia, Phenacovolva, Xandarovula,* etc. — used for the very similar shells we are discussing. They are involved in a complicated nomenclatural mess concerning type specimens of old European species, fossils, and many misleading Cate generic names. To get a taste of the problem, read the introduction to Fehse (2001) for the convolutions involving just one group of eastern Pacific false cowries. For convenience, I'm just putting *lenoreae* in *Phenacovolva* Iredale, 1930, but the oldest name for the group probably is *Simnia* Risso, 1826. Interestingly and confusingly, *Simnia* and *Phenacovolva* currently are in different subfamilies as indicated by molecular genetics studies, though their shells seem impossible to assign to genus.]

I think I was wrong when I looked for the closest relatives of *P. lenoreae* in the eastern Pacific. They really are in the Indo-Pacific and they probably really are similar to *P. brevirostris* Schumacher and its many variations that have been described as full species. A reading through the generic discussion of *Phenacovolva* in Lorenz & Fehse (2009: 122) and a glance through their plates (166-188) show just how variable these snails really are and how it is almost impossible to isolate any particular variant to give it a name. The variation extends into at least the genus *Crenavolva*, where (with the exception of obvious teeth on the labrum) several species also bear a strong resemblance to *P. lenoreae*. Internet dealers, for instance, currently are selling a Philippine *Phenacovolva/Crenavolva* species that from photos appears identical to *P. lenoreae*, though there may be differences in the lip. Additional small differences in the posterior terminals and color pattern seem to make *P .lenoreae* distinct from similar Indo-Pacific forms such as *P. barbieri* Lorenz & Fehse and *P. insculpta* Odhner, but I bet it would be difficult to separate individual specimens with no locality data from a variety of other "species" falling into genera of what are recognized as three subfamilies in Lorenz & Fehse (2009).

Temporary Conclusion to the Story

What to make of all this? Basically, the situation has not changed much since 1980. Genera and species of false cowries based on shells are overlapping highly artificial constructs that probably bear no real information on relationships. *Phenacovolva lenoreae* possibly is the eastern end of a group of populations or species related to the variable and widespread *P. brevirostris*. Shells from Panama to Ecuador (at least the ones that reach the market) appear very consistent in shape, size, and color pattern, and they appear distinct from at least most other populations of *Phenacovolva* and conchologically similar genera in the Indo-Pacific. I would suggest collectors continue using the name *P. lenoreae* until anatomical and molecular studies clear up the mess of this family — may we all live so long.

I applaud Lorenz and Fehse for making a first attempt at a reasonable review of the Ovulidae, but as they themselves imply, it will be a long time before we can know exactly what to call the different genera and species of false cowries.

Indo-Pacific ovulids similar to *Phenacovolva lenoreae* in size, shape, strucure, color, and pattern. 1-2: *Phenacovolva barbieri* Lorenz & Fehse, 2009, 24-26mm; 3-4: *Phenacovolva brevirostris* (Schumacher, 1817), 26mm; and 5-6: *Phenacovolva insculpta* (Odhner, 1919), 22-24mm. Differences among these species and with *Phenacovolva lenoreae* are subtle but distinctive. Images courtesy of Femorale (www.femorale.com).

So there you have almost 2,000 words on a 20mm shell that would never make headlines anywhere, but is not atypical of the story of almost all gastropod species of sea, land, and freshwater. Each species has its own problems and typically many different possible solutions. The history of each species is constantly changing and subject to many interpretations, something that should be kept in mind next time you type out a label for a new specimen.

Acknowledgements

My heart-felt thanks to the great people at the Biodiversity Heritage Library (Harvard MCZ) for making available online so many journals and papers that in the past would have taken months to find. Thanks also to the Interlibrary Loan Services at LSU Alexandria for obtaining papers from journals presently NOT available through www.biodiversitylibrary.org. Full citations for all the genera and species mentioned here can be found in the ovulid book. I also have great respect for Felix Lorenz, Dirk Fehse, and the late Crawford Cate, for having the courage to actually work with this complicated and frustrating family. Not many conchologists, including this one, would have had the guts to put out ideas that they know will be shot down probably sooner than later.

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Jerry G. Walls
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2017 SHELL SHOWS & RELATED EVENTS

(January – August)

Information is subject to change. Please verify with individual organizations.

Jan. 14-15, 2017
52nd BROWARD SHELL SHOW, Pompano Beach, FL
Emma Lou Olson Civic Center, 1801 Northeast 6th Street
Alice Pace, 7405 SW 128 Ct., Miami, FL 33183
E-mail: alicepace90@att.net Tel. (305) 301-1296 (Cell)

Jan. 21-22, 2017
SPACE COAST SEASHELL FESTIVAL, Melbourne, FL
New venue: Eau Gallie Civic Center, 1515 Highland Avenue
Alan Gettleman, 2225 Tanglewood Lane, Merritt Is., FL 32953-4287
E-mail: lychee@cfl.rr.com Tel. (321) 536-2896

Feb. 3 - 5, 2017
54th ANNUAL SARASOTA SHELL SHOW, Palmetto, FL
Bradenton Area Convention Center, 1 Haben Blvd.
Donna Cassin, 3432 Highlands Bridge Rd., Sarasota, FL 34235
E-mail: dcassin941@gmail.com Tel. (941) 362-3302

Feb. 11-12, 2017
AUSTRALIA NATIONAL SHELL SHOW, Sydney, Australia
Balgowlah RSL Memorial Club, 30 - 38 Ethel Street, Seaforth, NSW 2092
E-mail: shellshow@sydneyshellclub.net

Feb. 18 , 2017
FUM (FLORIDA UNITED MALACOLOGISTS), Deland, FL
Allen Hall, Stetson University, Deland, FL
Sims Kline
E-mail: skline@stetson.edu Tel. (386) 747-7321

Feb. 24-25 , 2017
ST. PETERSBURG SHELL SHOW, Seminole, FL
Seminole Recreation Center, 9100 113th St. N., Seminole, FL
John Jacobs, 202 Soldier Court , Seffner , FL 33584
E-mail: johncheryl@earthlink.net Tel. (813) 309-2608 (evening)
Exhibit form available at web site: http://www.stpeteshellclub.org

Mar. 2 - 4, 2017
80th SANIBEL SHELL SHOW, Sanibel, FL
Sanibel Community Center, 2173 Periwinkle Way
Mary Burton, 558 Foxcreek Drive, Lehigh Acres, FL 33974
E-mail: marybsanibel@hotmail.com Tel. (239) 395-3626
Website: www.thesanibelcaptivashellclub.com

Mar. 9-11, 2017
MARCO ISLAND SHELL CLUB SHOW XXXV, Marco Is., FL
United Church of Marco Island, 320 North Barfield
Jae Kellogg, 1402 N. Collier Blvd., Slip D-6, Marco Island, FL 34145
E-mail: pjsailkw@gmail.com Tel. (239) 253-8483

Mar. 11-12, 2017
XXIX PARIS INTERNATIONAL SHELL SHOW, Paris, France
Espace Charenton, 327 rue de Charenton, 75012 Paris
Perrine Dardart, 8, Rue des Tilleuls, 02190 Pignicourt, France
E-mail: perrine.dardart@gmail.com Tel. 33 (3) 23-22-46-41

Apr. 29, 2017
BRITISH SHELL COLLECTOR'S CLUB CONVENTION, Essex, England
Theydon Bois Community Centre, Essex
Deborah Rolfe, 15 Dene Holm Road, Northfleet, Kent DA11 8LF, UK
Email: deborah@deborahrolfe.orangehome.co.uk Tel. 44 1474 567 827

May 20-21, 2017
XXVII BELGIUM INTERNATIONAL SHELL SHOW, Antwerp, Belgium
"Extra Time" Sports Hall, Louisalei 24, Hoboken
Charles Krijnen, Burgemeester Jansenstraat 10, NL-5037 NC Tilburg, Nederland
E-mail: bvc.shellshow@planet.nl Tel. 31 (13) 463 0607
Website: www.bvc-gloriamaris.be/beurs_e.htm

Jun. 10-11, 2017
GULF COAST SHELL SHOW, Panama City Beach, FL
Panama City Beach Senior Center, 423 Lyndell Lane
Jim Brunner, 2511 Parkwood Drive, Panama City, FL 32405
Email: jili@knology.net Tel. (850) 215-2086

Jul. 1 - 2, 2017
TOWNSVILLE SHELL SHOW, Townsville, Queensland, Australia
Orchid Society Hall in Kirwan
Jack Worsfold
Email: jnw_48@yahoo.com.au

Jul. 8 - 9, 2017
KEPPEL BAY SHELL SHOW, Yeppoon, Queensland, Australia
Gus Moore Pavilion at the Yeppoon Show Ground
Jean M. Offord, 277 McDougall St., N. Rockhampton, Qld. 4701, Australia
Tel. 61 (7) 4928-3509

Jul. 16-21, 2017
AMERICAN MALACOLOGICAL SOCIETY ANNUAL MEETING, Newark, DE
University of Delaware, Newark
E-mail: akittle@delmnh.org
http://www.delmnh.org/ams2017/

Aug. 15-19, 2017
CONCHOLOGISTS OF AMERICA ANNUAL CONVENTION, Key West, FL
Double Tree by Hilton – Grand Key Resort, 3990 S. Roosevelt Blvd.
Greg Curry Tel. (305) 797-6458 E-mail: beechnutkw@aol.com
(or) Ed Shuller Tel. (919) 812-1810
E-mail: eshuller@mindspring.com

Aug. 26-27, 2017
2nd ANNUAL WEST COAST SHELL SHOW, San Diego, CA
Casa Del Prado Rm. 101, 1650 El Prado, Balboa Park
David P. Berschauer
Tel. (949) 422-6585
E-mail: shellcollection@hotmail.com

Information Source:
DONALD DAN
COA Awards Chairman
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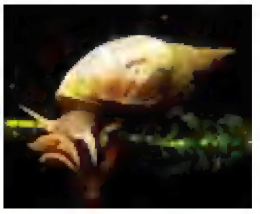
Tel. Voice & Fax (239) 481-6704
E-mail: donaldan@aol.com
2016-10-31

Pond snail chirality

Tom Eichhorst



It appears that the lowly pond snail, *Lymnaea stagnalis* (Linnaeus, 1758), has been a key figure in recent gene research. As originally reported in *Current Biology* (and then further discussed in Smithsonian.com and in *National Geographic*), researchers have discovered a gene in the pond snail that seems to determine chirality or asymmetry. As most shell collectors know, gastropod shells are either dextral (right-handed) or sinistral (left-handed). That is, when the shell is viewed with the spire upwards and the aperture facing the viewer, the aperture or opening will be on the viewer's right in a dextral shell and on the viewer's left in a sinistral shell. The vast majority (95%+) of marine gastropod species are right-handed or dextral, as are most freshwater species. Landsnails, while still favoring a dextral structure, are more evenly split in right and left-handedness.

Scientists hope this breakthrough will help in the understanding of asymmetry in other animals, where the exterior is symmetrical while the asymmetry is on the inside (the human heart is offset to the left while the liver is more to the right). In shelled gastropods, asymmetry is readily observable with the exterior shell. In the research on pond snails scientists found a single gene, formin, that when mutated caused the normally dextral shell to develop as a sinistral shell. The changes were observed in extremely early embryonic development and seem to be expressed through the maternal genes only. A downside to all of this is that the snails did not survive and the mutated gene did not cause a change in chirality in tested landsnails (*Euhadra* sp. and *Partula* sp.). Still, this is another step in our understanding of nature. (Image from Wikipedia.com).

Davison, Angus, Jennifer M. Holden, Harriet F. Johnson, Georgios D. Koutsovoulos, M. Maureen Liu, Paco Hulpiau, Frans Van Roy, Christopher M. Wade, Ruby Banerjee, Fengtang Yang, Satoshi Chiba, John W. Davey, Daniel J. Jackson, Michael Levin, Mark L. Blaxter. 2016. Formin Is Associated with Left-Right Asymmetry in the Pond Snail and the Frog, *Current Biology* 26(5): 654–660, 7 March 2016. also available online at: http://www.cell.com/current-biology/fulltext/S0960-9822(16)00056-7

Maya, Wei-Haas. 2016. Snail Shells Add a New Twist to the Mystery of Animal Asymmetries, online at: Smithsonian.com, uploaded 25 February 2016.

Shea, Rachael Hatigan. 2016. Snail shells reveal secret to asymmetry, National Geographic 230(5): 18.

Heterobranch sea slugs of Bocas del Toro, Panama

Jessica Goodheart

Heterobranch sea slugs are present in a variety of habitats, from coastal reefs to vast areas of the open ocean. Some groups of heterobranch sea slugs are broadly known popularly, such as nudibranchs (popular with underwater photographers due to their bright color patterns) and sacoglossans (known for their ability to sequester functional chloroplasts from their algal prey). Research has not, however, been limited to these popular groups. Many other groups of heterobranch sea slugs, including Pleurobranchomorpha, Pteropoda, Anaspidea, and Siphonarioidea have also been subjects of research during recent years.

My PhD research in particular is focused on the specific heterobranch slug group Cladobranchia (an infraorder of nudibranchs), and the evolution of nematocyst sequestration within this group (nematocysts are the stinging organelles cnidarians like jellyfish use for defense and prey capture). In the summer of 2015, I

Figure 1. The cladobranch *Berghia rissodominguezi* Muniain & Ortea, 1999, from Bocas del Toro, Panama.

Figure 2. Two specimens of *Platydoris angustipes* (Mörch, 1863), from Bocas del Toro.

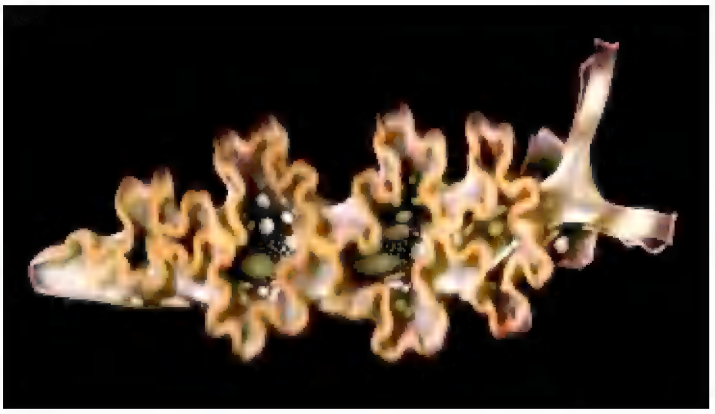


Figure 3. *Elysia crispata* Mörch, 1863, from Bocas del Toro.

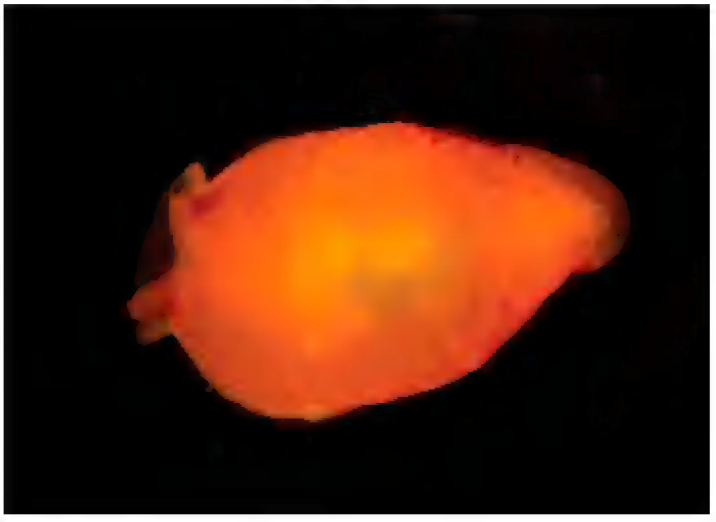


Figure 4. *Berthellina quadridens* (Mörch, 1863), from Bocas del Toro.

traveled to Bocas del Toro, Panama, to collect nudibranch specimens. My field work was possible thanks to the generosity of the Conchologists of America and other sponsors. In addition to my collecting activities, I participated in a workshop at the Smithsonian Tropical Research Institute (STRI), Bocas del Toro Research Station, that was focused on sea slug taxonomy. This workshop was focused on the collection, identification, and taxonomy of heterobranch sea slugs over the course of two weeks. During this workshop, it became apparent that the current field guides for the Caribbean, and especially the Bocas del Toro area, were outdated and lacking in certain types of information necessary for proper identification.

Only one guide existed for the Caribbean as of last year (Valdés et al., 2006), and while quite thorough, there were few details on which taxa included in the book were present in the Bocas del Toro area. In any case, most of the information on species from Bocas in this guide was taken from a previous publication (Collin et al. 2005). To make matters worse, heterobranch sea slug systematics and taxonomy has dramatically changed in the past decade, making much of the information contained in those guides outdated. Given this lack of current information, added to the fact that the areas near Bocas del Toro are frequently used in studies by researchers that pass through the research station, it was clear to us that an updated guide to the heterobranch sea slug taxa in Bocas was sorely needed.

To address this need, we (meaning the 13 students and 3 instructors for the course) published an article in *Marine Biodiversity Records* entitled, "Identification guide to the heterobranch sea slugs (Mollusca: Gastropoda) from Bocas del Toro, Panama" (Goodheart et al. 2016). In this publication, we increased the known heterobranch sea slug species in Bocas del Toro from 19 to 82, a greater than 400% increase in the known taxa for the area. Also, more than 80% of the species included in our guide are members of Nudibranchia and Sacoglossa, which are by far the most abundant groups of heterobranch sea slugs in the Caribbean.

Species collected during this work include common species present in much of the Caribbean, such as *Elysia crispata* (Figure 3), *Dendrodoris krebsii* (Mörch, 1863), and *Tritonia hamnerorum* Gosliner & Ghiselin, 1987, as well as very rare species like *Doriprismatica sedna* (Ev. Marcus & Er. Marcus, 1967), and *Nanuca sebastiani* Er. Marcus 1957. In addition, we managed to collect specimens from 5 different major heterobranch groups, including Pleurobranchomorpha, Cephalaspidea, Anaspidea, Nudibranchia, and Sacoglossa. In this publication, we also provide summarized descriptions and illustrations for described species. For most species the habitat information (substrate or food source on which specimens were found), and in some cases brief descriptions of the egg masses, are also included. Overall, the remarkable increases in diversity obtained during this study strongly suggests that the distribution of species within the Caribbean is still poorly known (at least in regards to some localities), and more surveys need to be conducted.

This work provides a great example of what can be accomplished with a group of dedicated people that are searching for specific types of animals, even over a short period of time. It also highlights the need for more range information and published species records when fieldwork is completed. In any case, the results of this study provide useful information for scientists, and hopefully citizen scientists, that work on the heterobranch sea slugs in Bocas del Toro, Panama.

Collin R., M.C. Díaz, J. Norenburg, R.M. Rocha, J.A. Sánchez, A. Schulze, M. Schwartz & A. Valdés. 2005. Photographic identification guide to some common marine invertebrates of Bocas del Toro, Panama. *Caribbean Journal of Science* 41: 638–707.

Goodheart J.A., R.A. Ellingson, X.G. Vital, H.C. Galvão-Filho, J.B. McCarthy, S.M. Medrano, V.J. Bhave, K. García-Méndez, L.M. Jiménez, G. López, C.A. Hoover, J.D. Awbrey, J.M. De Jesus, W. Gowacki, P.J. Krug & Á. Valdés. 2016. Identification guide to the heterobranch sea slugs (Mollusca: Gastropoda) from Bocas del Toro, Panama. *Marine Biodiversity Record* 9: 56. also available online at: https://mbr.biomedcentral.com/articles/10.1186/s41200-016-0048-z

Valdés Á, J. Hamann, D.W. Behrens & A. DuPont. 2006. *Caribbean Sea Slugs*. Sea Challengers Natural History Books, Gig Harbor, Washington, USA.

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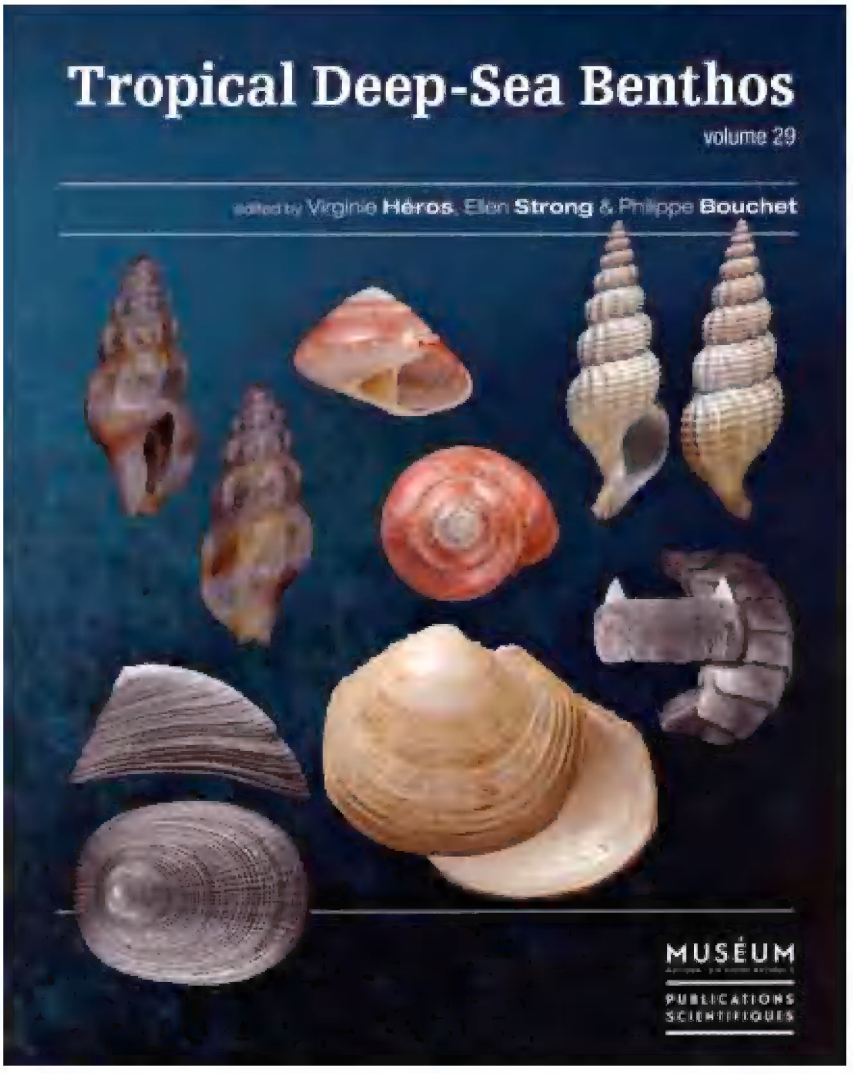
Tropical Deep-Sea Benthos, Vol. 29

(edited) by V. Héros, E. Strong & P. Bouchet



2016, Publications Scientifiques du Muséum, Paris, ISBN 978-2-85653-774-9 in hardcover with accompanying DVD, aprox. 8.5 x 11 inches, 463 pp., 555 figs., numerous high resolution color plates and SEM photographs, 86.00 € (about $92.00 plus shipping)

The ConchBooks (www.conchbooks.de, book ID 40595) advertisement for this book says, "The deep benthos of tropical seas is one of the last frontiers of biodiversity exploration, and a major reservoir of species still unknown to science. The French National Museum of Natural History (MNHN) and Institute for Research for Development (IRD) are conducting an unprecedented series of research cruises in the South and West Pacific, totaling so far over 5,000 deep-water sampling stations in remote and seldom-visited island groups. The *Tropical Deep-Sea Benthos* series, a continuation of the former *Résultats des Campagnes Musorstom*, showcases some of the biodiversity discovered through contributions from experts worldwide. The present volume includes six major taxonomic papers from experts of polyplacophoran, bivalve and gastropod molluscs, together documenting 213 species – 137 of which are new to science – and highlighting the extraordinary biodiversity of the South and West Pacific, in particular the Philippines, Papua New Guinea and New Caledonia. An introductory chapter highlights the role of citizen scientists in describing the molluscan diversity of the world, who are responsible for 57% of the new species descriptions, and the present volume is no exception." This clearly, and rather succinctly, covers this publication. This overview is then followed by a bibliographic listing of the seven papers contained in the book (reproduced below).

Bouchet, Ph., S. Bary, V. Héros & G. Marani. How many species of molluscs are there in the world's oceans, and who is going to describe them?

Sirenko, B. New, rare bathyal leptochitons (Mollusca, Polyplacophora) from the South and West Pacific.

Glover, E.A. & J.D. Taylor. Lucinidae of the Philippines: highest known diversity and ubiquity of chemosymbiotic bivalves from intertidal to bathyal depths (Mollusca: Bivalvia).

Marshall, B.A., N. Puillandre, J. Lambourdiere, A. Couloux & S. Samadi. Deep-sea wood-eating limpets of the genus *Pectinodonta* Dall, 1882 (Mollusca: Gastropoda: Patellogastropoda: Pectinodontidae) from the tropical West Pacific.

Vilvens, C. & S.T. Williams. New genus and new species of Solariellidae (Gastropoda: Trochoidea) from New Caledonia, Fiji, Vanuatu, Solomon Islands, Philippines, Papua New Guinea and French Polynesia.

Monsecour, K. & D. Monsecour. Deep-water Columbellidae (Mollusca: Gastropoda) from New Caledonia.

Fraussen, K. & P. Stahlschmidt. The extensive Indo-Pacific deep-water radiation of *Manaria* E. A. Smith, 1906 (Gastropoda: Buccinidae) and related genera, with descriptions of 21 new species.

As can be seen from the cover, this is a handsomely illustrated volume and with 137 newly described species, plus descriptions and images of lots of other mollusks not typically found on dealer shell lists; it is a fascinating read. If any bivalve collector reading this thinks they have a collection with a solid representation of Lucinidae, then read the article by Glover and Taylor. I think most will be amazed at the number of species in this family. Each of these well-selected pieces offers insights into the fascinating realm of deep-sea fauna. Sirenko describes deep-sea chitons, a group most of us thought limited to intertidal rocks. Marshall et al. describe new deep-sea wood-eating limpets accompanied with some fascinating SEM images. Vilvens & Williams describe some new Solariellidae. Monsecour & Monsecour describe deep-water columbellids and Fraussen & Stahlschmidt describe new buccinids. A decade or so ago a lot of this would have been interesting but of little use to the average collector. Today, however, with fishing expeditions trawling ever deeper, these shells are showing up on Internet auction sites and dealer lists.

So, lots of new species, great photographs, deep-sea mysteries -- anything else of interest? Read the first article by Philippe Bouchet et al. He is senior professor and head of the Malacology Laboratory and Taxonomy Collections Unit of the Muséum national d'Histoire naturelle in Paris. He is also a Commissioner of the International Commission on Zoological Nomenclature (ICZN, http://iczn.org/) and Chief Taxonomic Editor of the World Register of Marine Species (WoRMS, http://www.marinespecies.org/). Philippe Bouchet, along with co-authors Sophie Bary, Virginie Héros & Gilberto Marani, provide the reader with the history, the present state, and the probable future of molluscan taxonomy - how many species have been named, how many remain to be named, and who is doing the naming. Of interest (spoiler alert), they determine that some 50,000 species of mollusks have been named and that there are probably another 150,000 remaining unnamed! They also demonstrate that the number of new species named increases each year and that over half are now named by "citizen scientists," rather than professional malacologists. This paper is available as a PDF at: https://www.researchgate.net/publication/308902446_How_many_species_of_molluscs_are_there_in_the_world%27s_oceans_and_who_is_going_to_describe_them

This book has a wealth of information and is certainly affordable and deserving of a place on the conchologist's shelf.

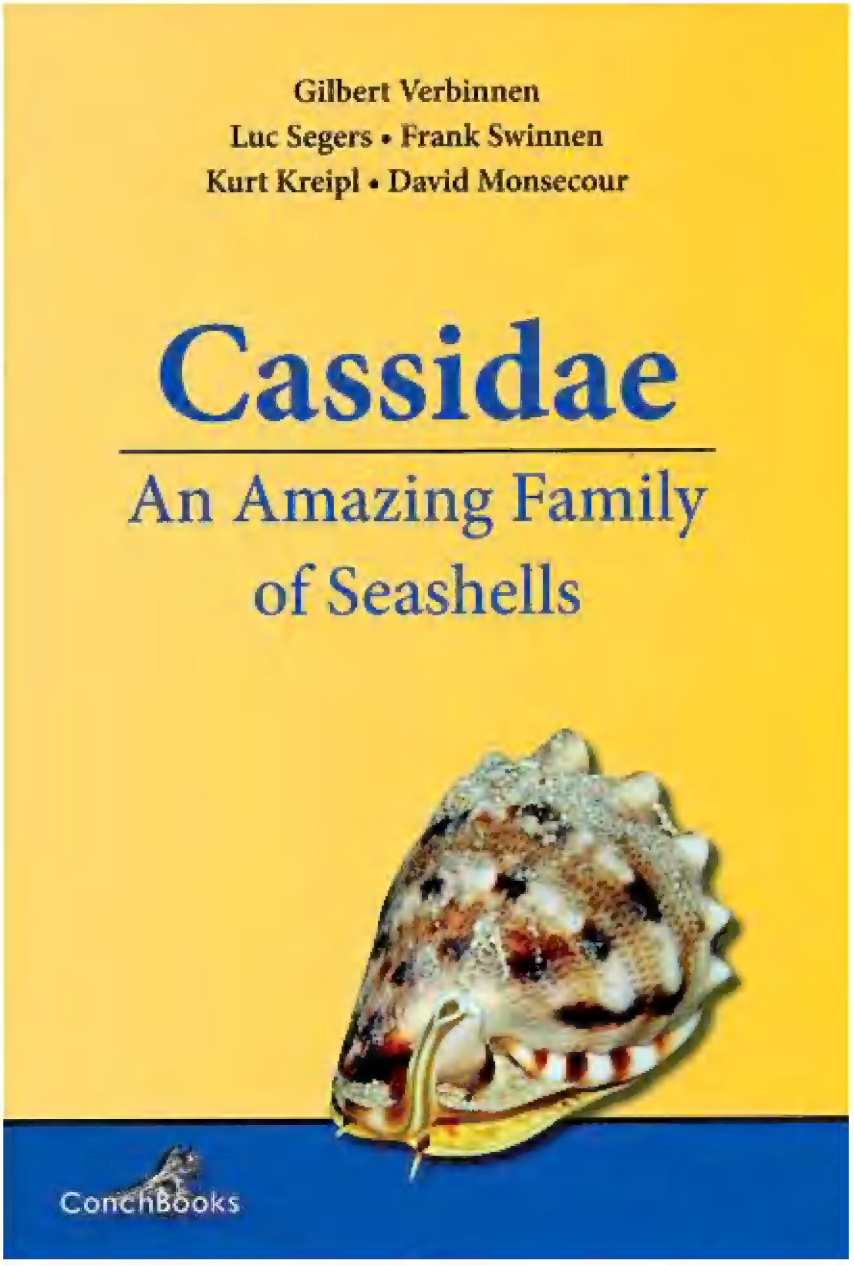
Thomas E. Eichhorst
thomas@nerite.com

Austrotrophon catalinensis **(I. Oldroyd, 1927), 55mm, California. Never really common, this is now a rare shell in collections as much of the home range of this species has been closed to collecting.**

This is a bronze sculpture (one of nine planned in the series) based on *Cassis madagascariensis* Lamarck, 1822. It measures 16 inches in length and weighs a whopping 18 kilos (39.6 lbs). The artist lives and works in Worcestershire, England, and has priced this piece at £3,990 (about $5,000) including shipping. Inquiries can be made at: kccdesigns@aol.co.uk

Cassidae: An Amazing Family of Seashells

by Gilbert Verbinnen, Luc Segers, Frank Swinnen, Kurt Kreipl & David Monsecour



2016, ConchBooks, Harxheim, Germany, ISBN 978-3-939767-72-5 in hardcover approx. 8.5 x 11 inches, 251 pp, 131 full page high resolution color plates, and numerous smaller B&W images, about 86.00 €. Available from MDM Shell Books (www.mdm-shellbooks.com) & ConchBooks (www.conch-books.de).

The authors state, "...this book is strictly conchological and ... was compiled for the use of those who wish to acquire an elementary acquaintance with the subject, as well as for authors and others who (eager to extend their knowledge and to pursue their researches) require a book of reference containing a general outline of what has been done by those who have trodden the same path before." What this means for the reader is a superior reference book on this variable and fascinating family. The text is concise, the taxonomy is as recent as can be found, and the color plates are clear with apertural and dorsal shell views and most often several specimens illustrated to clearly demonstrate variability. Each shell is well described in the text portion with a B&W image for reference and a clearly stated distribution. Most species write ups also include a "note," with interesting facts about the species, such as its history or taxonomic issues. The book is arranged alphabetically by genus and then within each genus is an alphabetical listing by species. Each genus and subgenus is described as a lead-in to the species descriptions. Color plates are grouped together after the species write ups. Each plate is numbered and also has the page number of the species write up. Synonyms are provided as is a separate listing of type specimens and type locality data (also an easy reference to the correct scientific name).

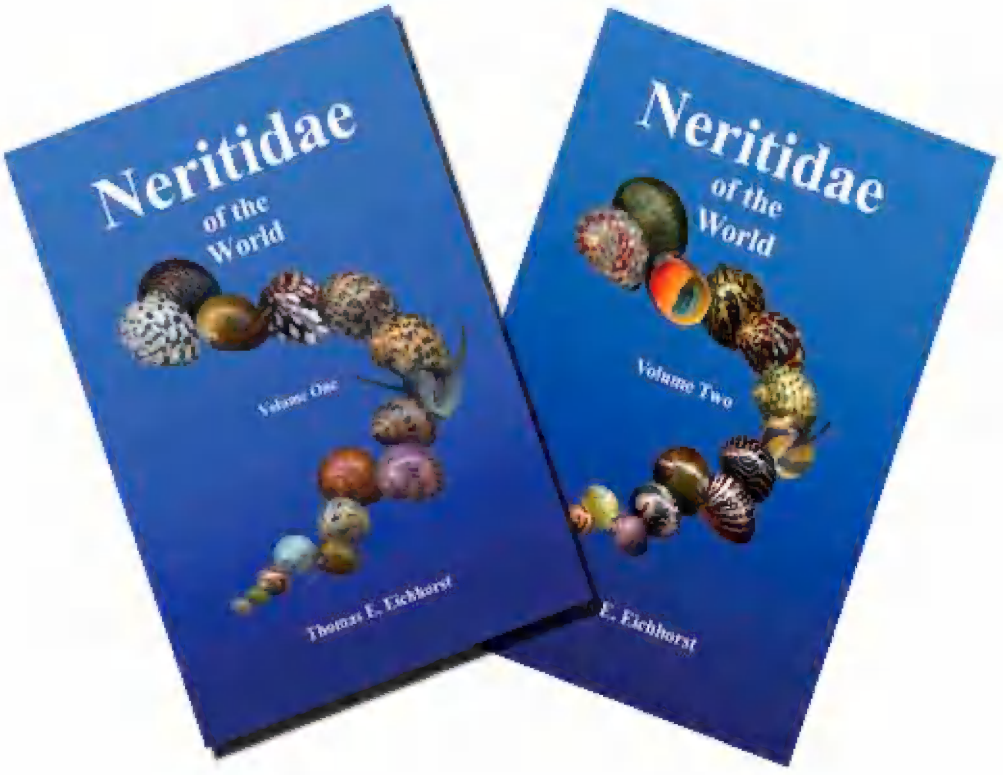
Cassids are a collector favorite, but proper identification can be difficult. The two previous works by Kurt Kreipl (*Recent Cassidae*, 1997 and *Cassidae*, 2008) are excellent works, but recent name changes and species discoveries demanded an update, and this volume does that quite well. The authors do not agree with some recently described species, but for the most part these are illustrated as synonyms and the reader can decide what course to follow. I have both of Kurt Kreipl's previous cassid books in my shell library and frankly questioned the need for yet another. Thankfully, I decided the price was certainly reasonable and went ahead and ordered a copy. It was a good decision and this newest book will now be my go-to volume for Cassidae. Thanks to the authors for a superb book and congratulations.

Thomas E. Eichhorst
thomas@nerite.com

Neritidae of the World - Volumes One & Two

by Thomas E. Eichhorst

Vol 1: ISBN 9783939767701, vol 2: ISBN 978 3 939767763, published in 2016 by ConchBooks, Hackenheim, Germany, hardcover in laminated boards, A4 size 21 by 29.5 cm. (about 8 by 11.75 inches). Vol 1 with 694 pages, 198 full-page color photographic plates as well as many other photos and SEM scans of the shells and their parts and other photos in color to help with shell identification. Vol 2 with 672 pages, 150 full-page color photographic plates as well as numerous other color photos, maps, charts, b&w photos throughout the book. Contains updates and corrections for the first volume. Each vol $179.95 from MDM Shell Books (www.mdmshellbooks.com). Also available on Amazon.com and for 148.00 € from ConchBooks (www.conchbooks.de).



Although the nerites, like many other families of shells found in shallow often intertidal water, are given little if any attention by the majority of shell collectors, this book may well be the one that will lead more of us to understand the beauty and the complexity of these shells. While most of the books we have and use cover some shells in this family, this is the first time to my knowledge that information about the entire and rather complex family can be found in a single book. The nerites you thought were just intertidal dwellers are also found miles inland in fresh water, in trees like landsnails, in coral reefs, in isolated desert pools, and in deep water. To simply say that this is a superb book does not do it proper justice. It is nothing less than a comprehensive look and study of these shells that have been the focus of the author's work for a great many years. We owe Tom Eichhorst a tremendous "thank you" and I hope that the second volume in this set will be on the way shortly.

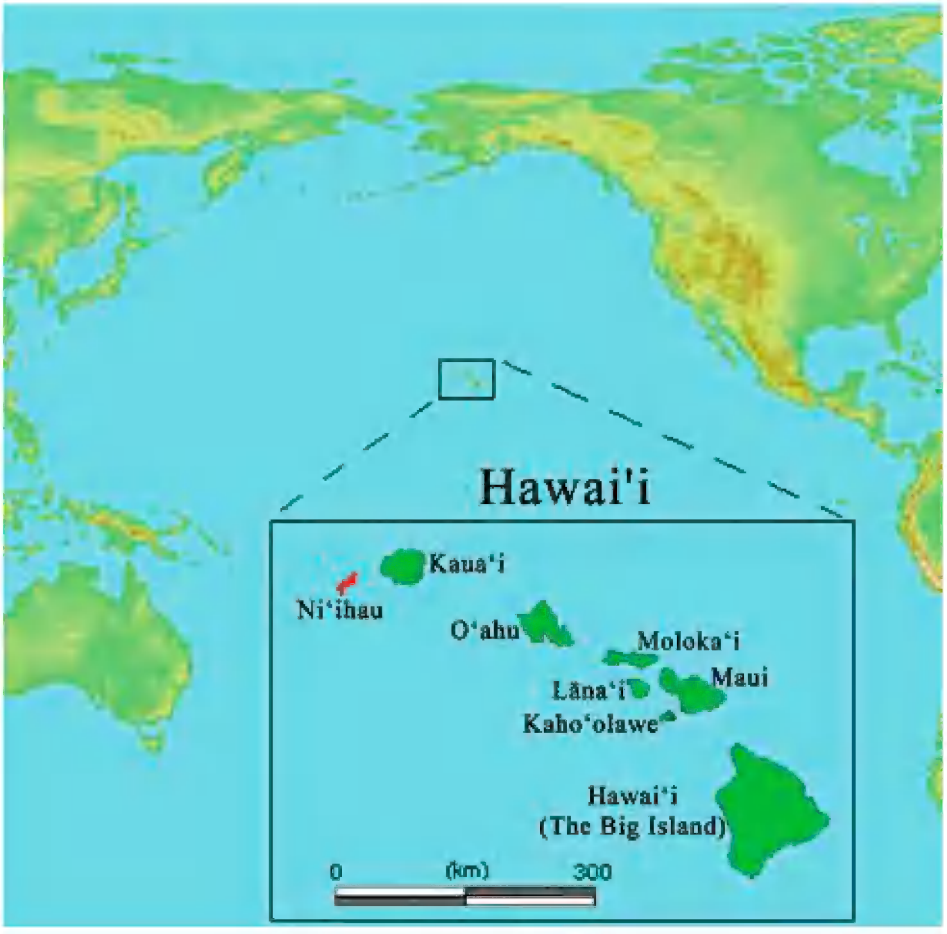
There is very little that I can say about this second volume other that you can take all the good comments you have heard about it, and the capsule reviews that I did for volume one, and double them. This is simply an amazing set of books and it reflects the author's long years of study and love of these shells that he shares with us in these books. In the two volume set we are presented with more than 300 species of these shells, over a dozen newly described, and a few reclassified. Many of the shells are familiar to us and many we have never seen before. Many have not been illustrated for over 100 years! Many of the species are quite variable and we get a good look at the variations that can occur. The photographs are superb and the descriptive material is complete, unlike so many other publications today that are almost devoid of description. If you love shells or if you study shells, you'll want to have this set of books on your reference shelf. Nerite shells are often not very popular with shell collectors because while there are maybe 50 that are commonly found on dealer lists, there are another 250 that until now were almost impossible to properly identify. Just thumbing through the plates in these books may very well reverse your opinion about this family. The second volume also covers several families closely related to Neritidae, including: Helicinidae, Hydrocenidae, Neritiliidae, Phenacolepadidae, and Titiscanidae. The two volumes total 1366 pages, with 348 full-page color plates and hundreds of other color images!

We have only about 10 copies of this book available now that we brought in by airmail. The bulk of our order for this title will be coming by sea freight and will probably not arrive until May 2017. So if you want a copy quickly, don't wait, place your order now.

Bob Janowsky
mail@mdmbooks.com

The *Lei Pupu o Ni'ihau*

Betty Ruggeri (photo by Nick Ruggeri unless otherwise indicated)



Less than one hundred square miles in area, Ni'ihau is one of the smallest islands of the Hawaiian chain. Image from Wikipedia.com.

Looking out from the observation point at Spouting Horn on Kauai Island, Hawai'i, you can get a good view of the shoreline feature that gives this spot its name. Sometimes, when the swell is right, the blowhole is downright impressive and sometimes, looking further out, you can see a dark smudge, a denser looking bit on the horizon. This is the fabled island of Ni'ihau, lying nearly twenty miles off Kauai's southwest coast.

Variously described as "mysterious," or "forbidden," this tiny member of the Hawaiian chain remains as a monument to "the old days." Purchased from the Hawaiian king (Kamehameha V) by Elizabeth Sinclair in 1864, the island has remained in private ownership and has traditionally been a place where the traditional Hawaiian life-style is still followed.

On Ni'ihau, there are no power plants, as we know them; solar energy supplies what electricity there is, which isn't much. There is no running water. Rainwater catchment provides fresh water, but sometimes not enough, as the mountains of Kauai block the path of the moisture-laden trade winds. During some droughts, the entire population of Ni'ihau has been forced to emigrate to its larger neighbor, Kauai. There are no cars on little Ni'ihau, no trucks, no hotels. A Naval installation on the coastal cliffs provides 80% of the island's income.

Could we live this way? As it happens, many of the locals have not been able to cope with the primitive conditions. The population has been steadily shrinking, from the original few hundred to fewer than one hundred residents, as the younger generation looks for better paying jobs and amenities on the other islands.

Between 1986 and 1992, the island became more accessible. Strictly guided tours and safaris became available, although in the absence of overnight accommodations they were necessarily brief.

Prior to its privatization, Ni'ihau was respected for making the finest reed mats in the islands. Today the location is well known – in some circles, almost revered – as the source of one singular product, the *lei pupu o Ni'ihau*, or shell lei, still crafted by some of Ni'ihau's few remaining residents. The creation of a Ni'ihau lei is truly a labor of love, sometimes requiring a year or more to complete, and every lei is unique. Ni'ihau leis are works of art, legally protected against counterfeiting since 2004.

In order to create a *lei pupu*, the artist must gather great quantities of tiny shells in good enough condition to be used, which may take weeks or months (a single strand may require more than two hundred individual shells). Next the usable shells are sorted by color, according to the pattern in the mind of the worker.

The majority of Ni'ihau leis are composed, at least in part, of the minute shell of *Colonista verruca*. In order to string the shells, two openings must be found or created in each tiny shell. Sometimes a natural drill hole is in the correct position, but usually the artist must carefully drill the shell to create the second opening. The shell structure of some species lends itself to an alternative method of forming the hole for the string. The tip of the spire can be filed down until the string can be passed through to the aperture.

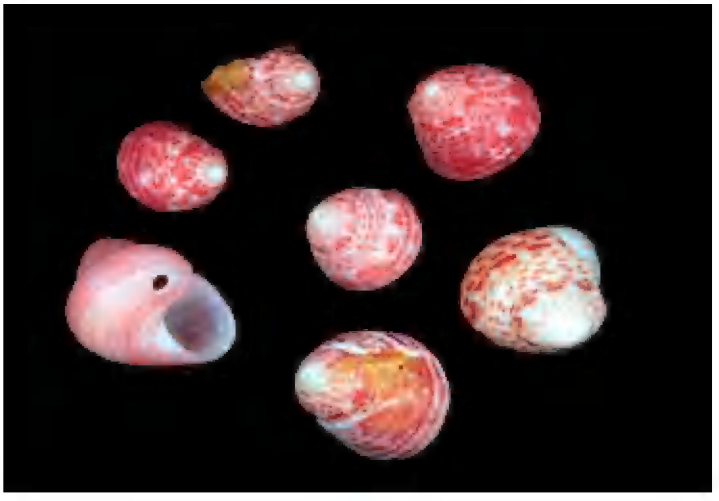
Small cowry shells, such as *Monetaria annulus* (Linnaeus, 1758), are "pre-structured" for ease of stringing. Traditionally the "string" was passed through the shell from end to end and held in place with a tuft of fiber or bit of fabric. Besides the abundant *Monetaria annulus*, many other small cowries are used: *Purpuradusta fimbriata* (Gmelin, 1791), *Luria isabella* (Linnaeus, 1758), or *Monetaria moneta* (Linnaeus, 1758), all lend themselves to use in leis. Visitors to Hawai'i often come home with "airport leis" of *Monetaria annulus*, but these are a far cry from the intricate art of Ni'ihau. The ventral surface of the shell is usually drilled for use in mass-market stringing.

However they have been prepared, the shells are finally strung in the pattern imagined by the artist. Originally, pieces were strung on natural fibers; more recently, man-made "fibers," similar to monofilament fishing line, have been used. Various stringing styles are found: single, double, triple, and even quadruple strands may be variously looped and twisted together. The color patterns achieved depend on the natural color of the shells, not artificial pigments.

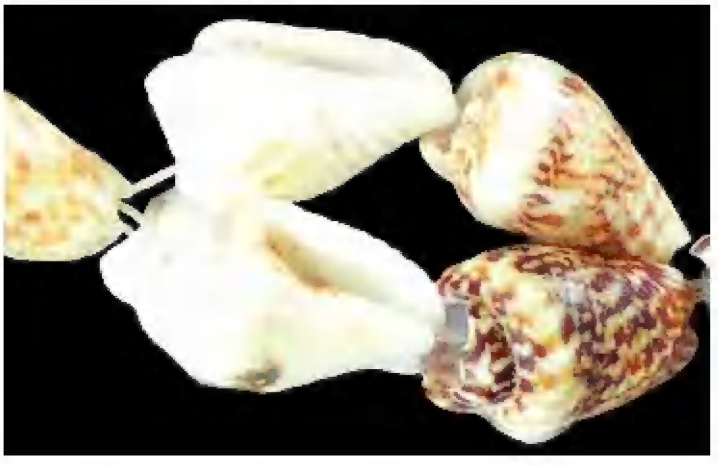
Three small molluscan species make up the bulk of the finest *lei pupu*. *Momi* are the shells of a small columbellid, *Euplica varians*. The shells occur in a variety of forms, from pure white, through a host of spots, lines, and squiggles in shades of brown; some are so heavily patterned as to appear nearly dark brown. A second columbellid, *Mitrella margarita* (Reeve, 1859), also provides various patterns in shades of brown. These are called *laiki*, or "rice shells."

Shades of red and pink are often required by a Ni'ihau design. Such colors are available in the minute turbinid, *Collonista verruca*, which is sometimes found

Each strand in this elegant lei is made up of hundreds of the tiniest shells used, all sorted by color. Photo by Pat Whitaker.



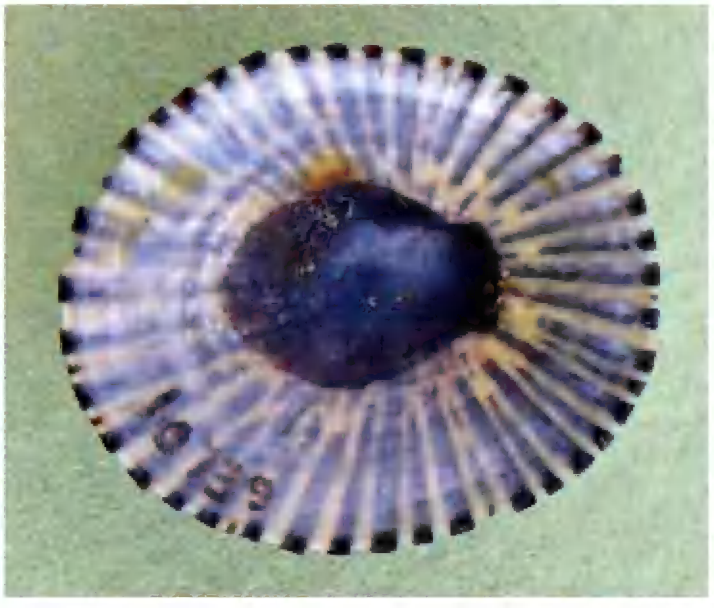
The majority of Ni'ihau leis are composed, at least in part, of the minute shell of *Collonista verruca* (Gould, 1845).



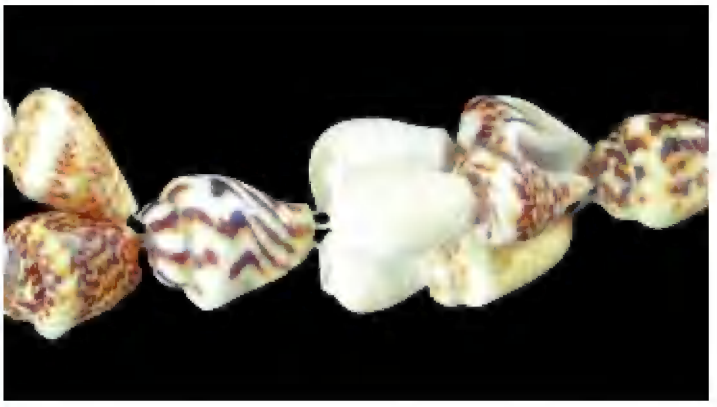
Since the apex of the nearly white shell at lower left is visible, it must have had a convenient drill hole on the side of the spire. The other three have been filed.

The various colors of kahelelani enable the artist to create patterns such as this.

This *kahelelani* earring contains sixty-five individual shells (yes, as a matter of fact, I did count them).



A small specimen of *Cellana exarata* (Reeve, 1854), the common opihi, sometimes used as a fabric decoration.



This section of a "mass-market" *momi* lei shows the variability of *Euplica varians* (G.B. Sowerby I, 1832).

This elegant Ni'ihau lei is made of matched white momi shells. The clasp shells are *Nucleolaria granulata* (Pease, 1862).

in great numbers in beach drift. These *kahelelani* shells are among the tiniest used in the construction of leis. Incidentally, *kahelelani* shells are named for Kahelelani, one of the *alii nui,* the ruling nobles of Ni'ihau.

Kahelelani are nearly spherical, with an average diameter of about five millimeters, making them some of the most difficult shells with which to work. In order to use such a shell in a lei, a second hole must be created opposite the natural aperture, by drilling or filing. The thought of doing this, after so much time has been expended in gathering the shells in the first place, is absolutely terrifying! Actually, many shells shatter in the process, requiring even more collecting and sorting.

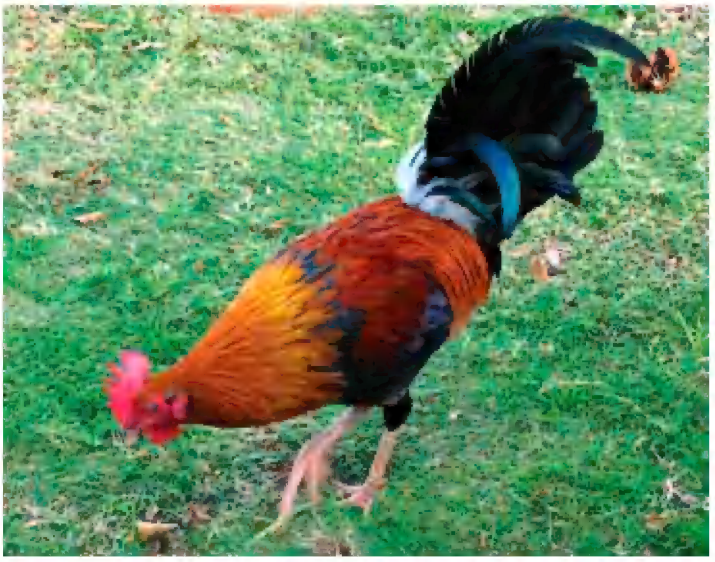
Many more species of small shells are used in the construction of leis, from the relatively large *Turbo sandwicensis* (Pease, 1861), to fragile juveniles of the ribbed limpet, *Cellana exarata.* Valves of small pectinids, such as *Chlamys* and *Haumea*, are used to decorate belts and hatbands.

Disks formed from the posterior section of *Conus sponsalis* shells are frequently found in beach drift. These can be used as accents or even as the sole species in a lei. Even though most of the leis are made only from shells, other materials are sometimes used, as in the case of the scallop-

In this example, sections of *Conus sponsalis* Hwass in Bruguière, 1792 form the "endpoints" of the lei, next to the commercial clasp.

Momi in ivory-white and multicolor versions, *kahelelani* in their loveliest colors. Cone tops and cowries make up this lei.

View of the rugged cliffs of windward Ni'ihau (the north-eastern shore). Image from Wikipedia.com.



The red jungle fowl are an invasive species that is abundant on Kauai. And they start crowing at four in the morning!

studded hatbands mentioned earlier. Shells such as limpets can be attached to decorative ribbons. Occasionally, fabric is incorporated into the structure of a lei.

Faced with so many possibilities, a Ni'ihau shell-worker may have some difficulty deciding exactly what shells to use. One possible solution for the confused artist? Use them all!

The number of new Ni'ihau leis being made is decreasing, as fewer and fewer of the original artists remain on the island, but there are still a great many available. The shops at Spouting Horn still carry some leis, but not nearly as many as they did thirty years ago. The Hawaiian Trading Post in Lawai (up the road from Poipu on Kauai Island) has an excellent collection of spectacular ceremonial leis, which are not for sale, as well as a few smaller examples that are for sale. The ubiquitous Hawaiian chains, such as Long's Drugstores and Hilo Hatties have some nice leis, but most of them are not genuine *lei pupu o Ni'ihau.*

According to my highly reliable sources, the best place to find Ni'ihau jewelry these days is on line. Would you believe Ebay? Still a trip to Kauai, or even to Ni'ihau itself, would be fun. Even if you don't find the lei of your dreams, you'll be certain to encounter flocks of red jungle fowl (chickens). At Spouting Horn, they're more plentiful than either the Ni'ihau or the customers.

I am deeply indebted to Sue Hobbs and Pat Whitaker for sharing their treasures, as well as their treasure-trove of information. Without them this article would have been impossible. And without Regis D'Angiolini's initial suggestion, I never would have thought of it.

Betty Ruggeri
nbruggeri@verizon.net

Broward Shell Show – 14-15 Jan 2017

The scientific show area in at the Emma Lou Olson Civic Center, giving an idea of the expanse of the show this year.

Once again, the Broward Shell Club held a fantastic shell show at the Emma Lou Olson Civic Center, Pompano Beach, FL. This year there were 28 scientific exhibits covering a record 332 feet of exhibit space! The Chairperson was Alice Pace, who reported, "We had good attendance at the show both days. We stay open on Saturday until 6pm and even after 5pm we had a number people. On Sunday when we closed at 4pm, there were so many people I was concerned we wouldn't be able to get them to leave! The show, again this year, was a great success." The scientific judges were José Leal and Rich Kirk. The artistic judges were Mary Burton and Shannon Webster.

(Left): Doug Thompson with the COA Award for his display, "Self-Collected NW FL Deep Water Specimens." Doug's display featured specimens collected in the waters off Florida, at depths from 70 to 130 feet deep. His display had 12 cases spanning 23 feet.

(Left): Robert & Alice Pace with their DuPont Trophy for their display titled, "2016 COA Field Trip at End of Convention Land & Freshwater Collecting," in the category "Land or Freshwater Shells Any Manner."

2017 SHELL SHOW AWARDS – SCIENTIFIC DIVISION

AMERICAN MUSEUM OF NATURAL HISTORY AWARD
Martin Tremor, Jr. & Conrad Forler – "For The Love of Cockles"
Category: One Family Minor Any Manner

CONCHOLOGISTS OF AMERICA AWARD
Doug Thompson – "Self-Collected NW FL Deep Water Specimens"
Category: One Region Self-Collected

Gene Everson with his award for "Best of the Best." His display was "World-Wide Self-Collected."

Martin Tremor with the American Museum of Natural History Award for his and Conrad Forler's display titled "For The Love of Cockles."

THE DuPONT AWARD
Robert & Alice Pace – "2016 COA Field Trip at End of Convention Land & Freshwater Collecting"
Category: Land or Freshwater Shells Any Manner

"BEST OF THE BEST"
Gene Everson – "World Wide Self-Collected"
Category: Best of the Best

LEN HILL MEMORIAL
Doug Thompson – "Self-Collected Florida Lion's Paws"
Category: One Species – Any Manner

SHELL OF SHOW – Self-Collected
Linda Zylman – *Tridacna maxima*
Category: Single Shell Self Collected WorldWide

SHELL OF SHOW – Any Manner
Gene Everson – *Mantellina translucens*
Category: Single Shell FL/Caribbean Any Manner

JIM VUNKANNON MEMORIAL FLORIDA/CARIBBEAN TROPHY
Doug Thompson – "Self-Collected Florida *Spondylus*"
Category: Florida/Caribbean Self-Collected

GERRIT De GRAFF MEMORIAL
Allen Bennett – *Phyllonotus eversoni*
Category: Super 10

NEIL HEPLER MEMORIAL TROPHY FOR EDUCATIONAL EXCELLENCE
Tom Ball – "Cuban Land Shells"
Category: Land or Freshwater Shells Any Manner

BETTY HAMANN FOSSIL TROPHY
Robert & Alice Pace – "Broward Shell Club Field Trip Fossil Shell Collecting"
Category:Fossils

BEST STUDENT EXHIBIT SCIENTIFIC
Amelia Vasques – "High Tide Pride"
Category: Student – Grades 7 – 12 Any Manner

EXHIBITOR'S CHOICE AWARD
Doug Thompson – "Self-Collected Florida Lions's Paws"
Category: One Species – Any Manner

Scientific Judges José Leal (left) & Rich Kirk (right). Show Chair Alice Pace (middle) presented them appreciation awards.

Artistic Judges Mary Burton (middle) & Shannon Webster with appreciation awards presented by Show Chair Alice Pace (left).

Sarasota Shell Show - 3-5 Feb 2017

Ron & Mary Jo Bopp with their COA Award for their display of "Caloosahatchee Formation in Florida."

The 54th annual Sarasota Shell Club Shell Show was held on February 3-5, 2017, at the Bradenton Area Convention Center, Palmetto, Florida (above). This venue is quite spacious and this was needed as there were over 523 feet of scientific show displays featuring plenty for club members and the general audience to examine and enjoy. Shell Show Chairs were Nancy Marini and Donna Cassin. Awards Chair was Ron Bopp. Shell Show Judges were Rich Kirk and Gary Schmelz for the scientific division and Clark & Pam Rambo for the artistic division. The show was a great success and had a record number of scientific displays. Overall (Scientific & Artistic) the judges gave out 40 Blue Ribbons and 35 Red Ribbons, plus the named trophies and awards. The awards banquet was held Friday night so that winners could have their awards on display during the next day's show.

Part of the display, "Caloosahatchee Formation in Florida" by Ron & Mary Jo Bopp with their COA Award and blue ribbon.

Conrad Forler (left) & Martin Tremor (right) were awarded the DuPont Trophy and the Mote Gold Trophy for their display titled, "For the Love of Those Cockles."

Robert & Alice Pace with their Hertwick Fossil Award for their display titled, "Broward Shell Club Field Trip."

Greg Curry won the Small Scientific Award for his display of the "Genus *Livonia*." The award is being presented by Show Co-Chair Nancy Marini.

Harry Berryman took home the Most Beautiful Exhibit Award for his educational display, "Mollusks and Their Influence on Religion."

Awards Chair Ron Bopp stands ready with the show awards, trophies, and ribbons.

Doug Thompson displays the Sarasota Shell Club Member's Award for "Self-collected Lions Paws."

Shell Show Judges (left to right) were Clark Rambo, Pam Rambo & Gary Schmelz. Rick Kirk is not shown.

Good Work Ultimately Reaps Its (His) Reward

Harry Lee

This is an updated version of an article posted on the Jacksonville Shell Club web site (www.jaxshells.org). It is reprinted here in response to an email by COA President Harry Lee to Matt Blaine.

"Dear Matt,

I enjoyed reading your article in *American Conchologist*, "Surf and Turf Puerto Rican Style." Since I spent the summer of 1964 collecting the island, there was an element of sentimentality in revisiting some of your stop-overs.

I'd like to point out that your Fig. 24 is almost certainly not *Cymatium femorale* but rather *C. raderi*, a valid species, which had been historically dismissed as a synonym of the former and, after its description, still not fully appreciated taxonomically and zoogeographically.

I reviewed this predicament at <http://www.jaxshells.org/bobwork.htm>.

Harry Lee"

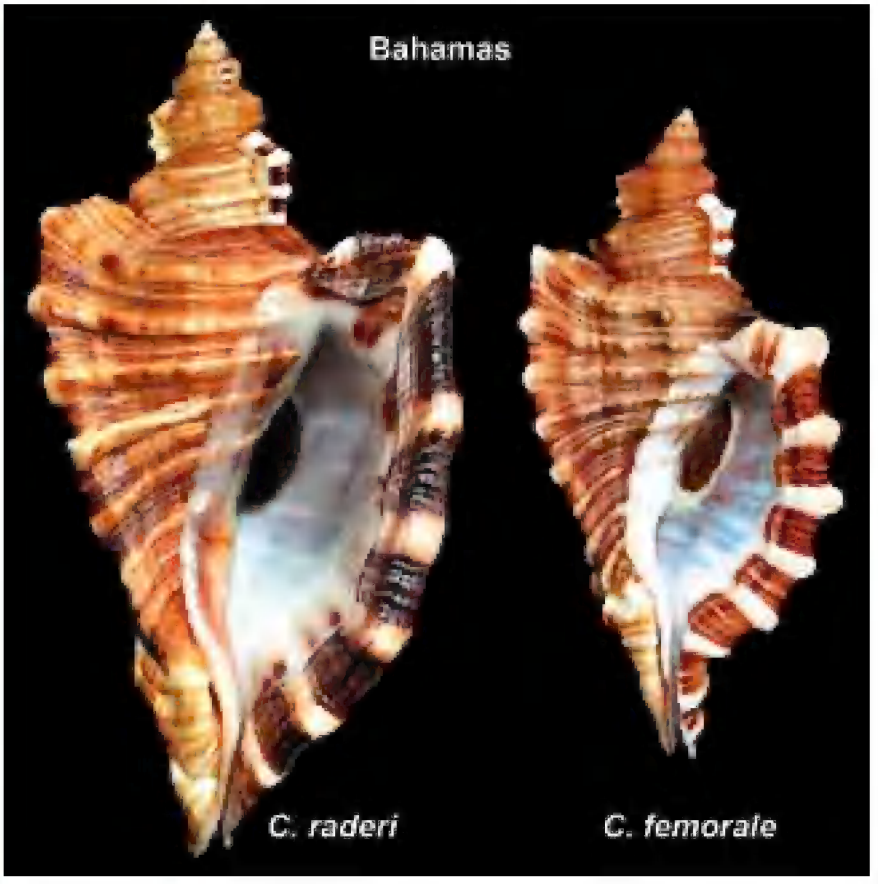


Fig. 1 *Cymatium raderi* (209.5mm) collected by Jim Miller in the Bahamas in 2003 next to Cymatium femorale (160mm) from Grand Bahama Island.

In 2003 Jim Miller shelled the island of Eleuthera, Bahamas, which he shared through a lavishly-illustrated report for *American Conchologist*. Probably the most noteworthy find on the trip was live 8.25 inch *Cymatium raderi* (D'Attilio and Myers, 1984) taken while at snorkeling depth (Fig. 1, left of a 160mm *C. femorale* from Grand Bahama Is.). He wrote: "Naturally, like everyone else, I thought of *C. raderi* as a species found much farther south, and all the specimens I have ever seen have been collected in Brazil." Jim's observation allows us to look closely at the taxonomy and underappreciated biologic potential of this snail and its relatives.

In the original description of *C. raderi,* D'Attilio and Myers (1984) identified specimens from Honduras (type locality), "Dry Tortugas, collected by shrimpers" and Tobago, as examples of the new taxon. Veteran shellers cast a skeptical eye when the "shrimp fishery" and "Dry Tortugas" are spoken together - a classic in conchological apocrypha. On the other hand, the authors also cited the specimen depicted in pl. 129, fig. 1 of Clench and Turner (1957), from Great Abaco, Bahamas, and captioned "*C. femorale* (Linnaeus, 1758)" as *C. raderi*; they didn't comment on fig. 2, a specimen from Bear Cut, near Miami Florida, collected by Robert Work.

Turn the clock back sixty years, and you might find now-retired University of Miami marine biologist Bob Work (pers. comm., 2005) working the shallows between Virginia Key and Key Biscayne near the spot where the Institution's Rosenstiel School of Marine and Atmospheric Science (then just the Marine Lab) was transplanted from Coral Gables in the summer of 1957. I have first-hand knowledge of that very scenario because I was there for the both collecting and the move, as a "high school summer fellow" at the University, and I frequently associated with Mr. Work. To be fair to the facts, I must admit my role was more idolatrous sycophant/common laborer than scientific colleague. Anyway, Bob still recalls collecting "a few" *Cymatium raderi* in Bear Cut from 1950 to 1960, when they were "not uncommon.... from *Thalassia* on clean sand....very shallow." He thought the truncated and incurved termination of the varices, weaker spiral cords, dentate aperture, reduced intervarical nodes, and the larger maximal size of this taxon set it apart from the shells of *C. femorale*, with which it occurred.

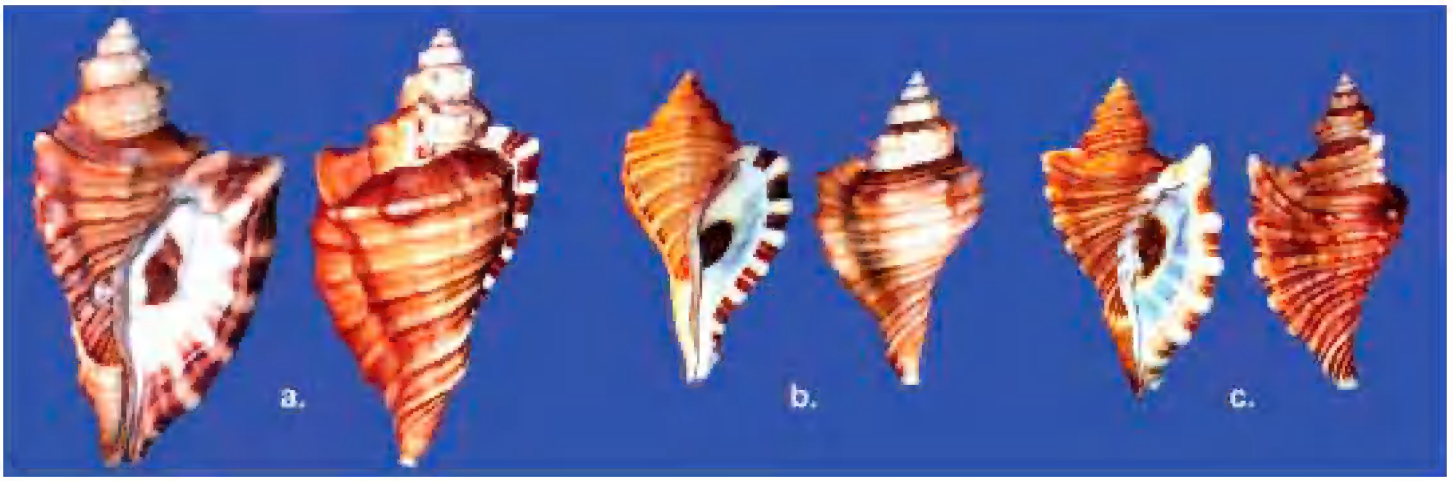


Fig. 2 shows two *C. raderi* and a single *C. femorale*. a. is a large *C. raderi* (146mm: UF 489678), b. is a smaller *C. raderi* (111mm: UF 489672), and c. is a *C. femorale* (112mm long). All three specimens were collected between 1950 and 1960 in Bear Cut, Key Biscayne, FL by Robert Work.

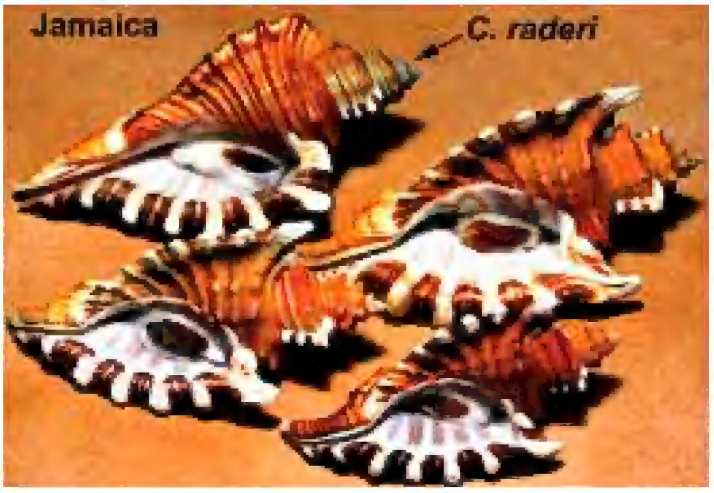


Fig. 3 large *C. raderi* with three *C. femorale*, all collected in Jamaica by Jim Miller.

Fig. 4 (left) *C. raderi* (204mm) from a fish pot in about 400 feet of water off Pigeon Point, northern Tobago, collected and photographed by the late Jane Boyle. It is now at the Florida Museum of Natural History (FLMNH; UF 281489).

As Bill Clench was preparing his Cymatiidae (now Ranellidae) monograph, Bob sent some Bear Cut specimens, which he had then determined to be different from *C. femorale*, along with some typical specimens of the latter, to the Museum of Comparative Zoology (Harvard U.). There Dr. Clench identified all the shells as *C. femorale* and incorporated not only Bob's Bear Cut record but illustrated one of the "different" specimens (Clench and Turner, 1957; pl. 129, fig. 2) as *C. femorale*. Now it is apparent that the figured shell is *C. raderi* not *C. femorale*.

Bob's observation (and tenacity) leaves little doubt that *C. raderi* isn't just "extending" its range; it's been in Florida and the Bahamas for over a half century (and probably eons). Although regional and inclusive taxonomic works [Henning and Hemmen (1993), Camp et al.(1998), Turgeon, Quinn *et al.* (1998), Redfern (2001), and Rosenberg (June 28, 2005)] don't reflect that fact for one explanation or another, there is every reason to think that these "new" observations are accurate - and even expected (see below).

We don't have to look much further to find locality records for *C. raderi* as yet unreported in the literature: (1) In his letter Bob also mentioned that he had recently examined two beach-drift specimens of *C. raderi* from the Paraguana Peninsula, Venezuela.[1] (2) Jim Miller has a specimen of *C. raderi* from Jamaica, with *C. femorale* (fig. 3). (3) Between them, the author and Bill Frank have four specimens measuring from 120 to 175mm taken from a depth of six feet on a rocky reef off Las Salinas, Dominican

[1]*Cymatium* (*C.*) *etcheversi* Macsotay and Villarroel, 2001 (pp. 65-66; pl. 6, figs. 14,15), named from the Margarita Platform off Venezuela, is clearly *C. raderi*. The authors failed to compare the two taxa, but they did acknowledge their new species occurs in Jamaica and South Florida, based on illustrations in Humfrey (1975: pl. 13, fig. 6) and M. Smith (1951: pl. 42, fig. 3). Interestingly, these figures actually depict *C. femorale*!

Fig. 5 two of four specimens of *C. raderi* taken from a depth of six feet on a rocky reef off Las Salinas, Dominican Republic.

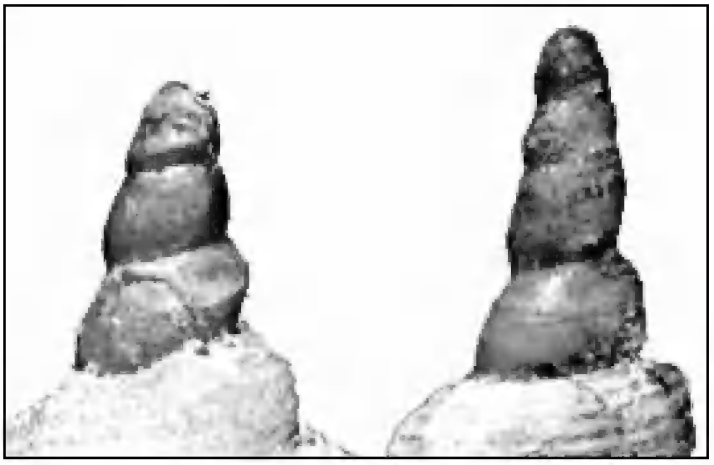


Fig. 6 "*C. femorale*" protoconchs, left: from Clench and Turner, 1947, pl. 129; right: Redfern, 2001, pl. 30, fig. 256B (adjusted to the same apparent magnification).[2]

Republic (Fig. 5). (4) Figure 4 is a 204mm specimen from a fish pot set in about 400 feet of water off Pigeon Point, northern Tobago, collected and photographed by the late Jane Boyle. It is now at the Florida Museum of Natural History (FLMNH; UF 281489).

Given the renowned longevity of triton (and most Tonnoidea) larvae, as reflected in the multispiral protoconch of "*C. femorale*" (fig. 6), one would expect them to have an advantage when it comes to larval dispersal and, consequently, zoogeographic range. There are dozens of cases in point to confirm this cosmopolitan tendency. "Now" C. *raderi*, ranging from southeast Florida and the Bahamas to Brasil (the latter added by Henning and Hemmen, 1993), is only approaching the norm for New World *Cymatium*. Even though we know that seven of our ten Jacksonville ranellid species are well-known to be circumtropical and two others amphi-Atlantic, triton ranges continue to be "extended" on a frequent basis as evidenced by the reports by Gibson-Smith et al. (1970) ["west African" *C. trigonum* in Venezuela], Kalafut (1988) ["west African" *C. tranquebaricum* in the Florida Keys], and Piech (1993) ["Indo-West Pacific" taxa: *C. gallinago* in Brazil; *C. mundum* in the Gulf of Mexico and southeast Florida; *C. pfeifferianum* in the Gulf of Mexico and Brazil, and *C. vespaceum* in Honduras and the Florida Keys], to name six species not (yet) found locally.

Now it is easy to see that new "extended" records are popping up and that tritons have prodigious powers of dispersal, but why do these finds appear to be so novel? There are probably two or three reasons: (1) Tritons are never particularly abundant where they live. Feeding on slow-growing echinoderms, many species cannot achieve robust enough population densities to allow easy collecting. This is likely the case in Abaco (Redfern, 2001). (2) As evidenced by Bob's travail, some tritons are hard to identify and may be concealed by an erroneous label. (3) International maritime commerce may facilitate veliger traffic (bilge stowaways).

[2] These protoconchs appear to differ significantly. Is it possible that two different species are involved, but which is which?

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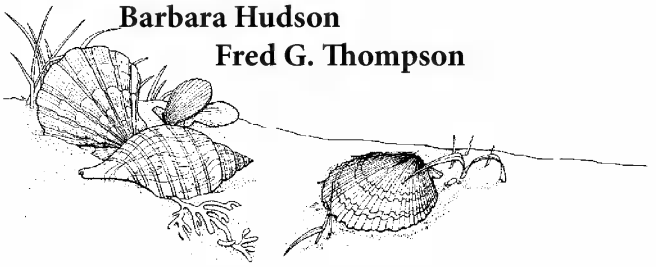
Harry Lee - shells@hglee.com

In memoriam:

Barbara Hudson

Fred G. Thompson



Fred Gilbert Thompson
(November 13, 1934 – December 27, 2016)

Malacology has lost one of its giants. Dr. Fred G. Thompson, Curator Emeritus of Malacology, later Invertebrate Zoology, at the Florida Museum of Natural History (FLMNH), died recently in Ocala, Florida. Fred's work on American Hydrobiidae, particularly of the southeastern states, as well as New World and Paleotropical terrestrial mollusks was pioneering and exemplary. As a curator he was welcoming to the amateur community and always willing to help sort out malacological conundra as well as to demonstrate the use of museum methodologies to allow many of his informal students to optimize use of his and other institutional collections. Members of the Jacksonville Shell Club partook in perhaps half a dozen field trips to the FLMNH beginning in the mid-1970's. Each of us always returned more enlightened and energized to extend our scientific endeavors.

I was fortunate enough to conduct field work in Fred's company both in the Austroriparian province of our country, e.g., the Paint Rock River <http://www.jax-shells.org/freshwat.htm> and its shores, as well as Honduras, Central America. While laboratory procedure, museum collections work, and didactic encounters play an indisputable role in biological studies, the experience of exploration and discovery in coordination with a truly gifted naturalist like Fred Thompson is an indelible intellectual asset always to be treasured. As with many others with whom Fred Thompson's life intersected, I valued his wisdom, intellect, counsel, and good cheer and shall miss him greatly.

Harry Lee

(a more extensive version was published in the *Shell-O-Gram* 58(1), Jan-Feb 2017)

Key West Convention & the Frederic Weiss collection 15-19 Aug 2017

Thomas Eichhorst

Aerial view of Key West looking east. 1. is the historic district, including the so-called "Little White House" used by President Harry Truman, the Key West Aquarium, Mallory Square, and a plethora of shops, bars, and eateries. 2. is the Key West airport. 3. is the Doubletree Resort Hotel (Hilton Grand). The hotel provides a free shuttle to and from both the airport and the downtown area.

By now I would hope that all COA members are aware the annual Conchologists of America convention will revisit the site of our 1980 convention – Key West, Florida. Our visit to the Conch Republic will be at the Doubletree Resort by Hilton Grand. Rates and such are listed under the image of the resort to the right.

The 2017 COA convention in Key West is shaping up to be quite the event. The venue couldn't be better – a top quality hotel set in a unique locality. This event is always first-rate and seems to get even better through the years. This year is no exception. In addition to interesting presentations, meeting old and new acquaintances, a chance to buy quality shells at the world renowned bourse, and fun filled silent and oral auctions of shells and shell related treasures, this year we have an influx of quality shells to the auctions the likes of which we really haven't seen before – the Frederic Weiss collection.

In the last issue (*American Conchologist* 44(4): 3) I wrote a hint about the Frederic Weiss collection. COA member Donald Dan had been working with Emily and Sydney Weiss for some time concerning the disposition of their father's shell collection. After several meetings they agreed to donate the collection (some 13,000 select specimens) to COA under Donald's stewardship. In return, COA agreed to establish an eponymous annual academic grant in memory of Frederic Weiss.

The Weiss family arranged for an independent appraisal of the collection, which was packed up by Donald

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and shipped (U-Haul) to his house. He then unpacked, cataloged, and repacked 28 boxes of larger shells and 150 separate drawers of smaller shells. Like COA did with Ed Nieburger and the Walter Paine collection, top quality shells (approximately 120 lots) were selected by Donald for the 2017 Key West oral auction (expected to more than double the normal proceeds from this auction). There were also numerous lots (hundreds) set aside for disposition by those in charge of the Key West silent auctions. He then set aside over 70 quality lots for the 2018 San Diego auction, with an additional number of lots set aside for review and disposition by those in charge of the San Diego silent auctions. The remaining shells will be sorted for sale. The cabinets were sold immediately as further shipping costs would have been an issue. Initial proceeds from this process have already netted monies for COA grant funds. The next two year's conventions will see this figure rise. The kindness of the Weiss family and dedication and hard work by Donald (800 hours over 4 months and a house full of boxes and shell cabinets) have greatly benefited COA.

Boxes of shells start taking up space at Donald's.

Volunteers (left to right) Dave Holzinger, Linda Zylman, and Jeff Oths start loading the truck with shells.

Cataloged shell drawers are marked with a green sticker.

Shells and shell cabinets fill the truck.

Still space to walk – barely. The Frederic Weiss shells have taken over the room, for the benefit of COA.

Shell collector – Frederic Weiss (1929-2015)

Emily Weiss

My father, Frederic Weiss, was curious about everything. He found wonder in all things and experiences and that curiosity was contagious. My father, graduate of Yale undergrad and Harvard Law, found interests in law and business, and ultimately became the owner of a computer leasing company. Funny to note that computers were not interesting to him, but the business of leasing was. A brilliant and busy mind that needed to be fed, he took on hobbies not by dabbling, instead through complete immersion.

He took on photography as a hobby before I was born, and I grew up with a basement that subbed as a darkroom where he spent hours experimenting with changes in exposure and processing time to produce haunting and powerful images. His images were well received in the field and he acquired many awards and accolades. In fact, one of his images was chosen for Time-Life Books of Photography.

He took an interest in ham radio, and our house soon wore several new antennae and wires wrapping the roof. TVs, phones, and radios in the house all reflected the dots and dashes he furiously tapped out as he aimed to reach folks from Russia to down the road. He received the highest certifications and was able to translate Morse code at a rate that was dizzying.

His love of music took over rooms of our house, first with albums, then cassettes, and finally with CDs. His head would nod to the beat be it Brahms or the Beatles.

And then there were the shells. The shells were started as a way for my Pop and me to spend time together. He and my sister had music, he and I had nature – fishing, dogs, and, he hoped, shells. It started small (as most of you know I suspect) and it grew quickly. We devoted a room in the house to the shells and aptly named it the shell room. Box after box came, each one holding an incredible treasure, sometimes also holding quite an odor as some of those shells came less than clean. We spent many hours in that room.

Over time my interests focused more on things that growing kids focus on – for me it was horses. I still sat in that shell room with my Pop and would open drawer, after drawer, after drawer, in wonder as he rattled off scientific names as well as locations, as I wondered about the behavior of the animal that lived in the shell. His interest continued and grew, and grew, and grew. He made friends around the world and could spend hours turning pages of catalogs, just as, I am sure, you do.

As his health started to fail him, he and my Mom moved permanently to Florida. He knew he ultimately wanted the collection to be donated somewhere and he honored me with the option to keep the collection until the time of donation. When my father passed away in October of 2015, I spent several days opening drawers and finding memories of my Dad and me. The gift he gave me was the memories and the curiosity.

Soon after, I researched for someone to help me value the collection as it was part of his estate. Donald Dan, whom many of you know, was recommended more than once, and it was he that I called. Donald brought back a string of memories of shell magazines and the sense of belonging conchologists had with each other. My Dad so enjoyed speaking to fellow conchologists!

As Donald opened drawers and gasped with excitement, I could feel my Father's curiosity. It was when I was sitting downstairs and heard him exclaim at the top of his quiet voice "Jack Pot" that I knew the collection had a purpose – to assure that others had the opportunity to wonder and be curious about shells through the Conchologist of America.

My family is at peace knowing the collection will not only support an organization to which my Father had a connection but that the collection will not hide in a museum basement. Instead, I know that somewhere, sometime soon, some little girl will be sitting with her mother or father and will peer over with wonder and curiosity as that next shell is unwrapped.

Highlights of the 2017 COA Convention – Key West, FL August 13-14 – Field Trips August 15-19 – Convention & Bourse

By Jeannette Tysor and Ed Shuller

Group photo taken at the 1980 COA Key West convention.

On Sunday and Monday, prior to the convention, six exciting tours are offered, starting with a Sunday morning snorkel trip to an offshore reef. When the morning trip fills, an afternoon trip will be scheduled. The Sunday trip is very popular and is filling up quickly. For those not going on the snorkel trip, a guided nature tour of Big Pine/No Name Key is offered. Cost is only $25 and includes transportation, lunch, and a souvenir booklet compiled by guide Bob Pace. Sunday afternoon you can take the guided Conch Train Tour of Key West, covering more than 100 unusual and historical sites. Sunday night is the Ghost & Gravestones Tour, stopping at different sites to recount acts of treachery, as well as stories of pirates and deadly love. Another snorkel trip is scheduled Monday morning to deeper waters. Monday afternoon there is a tour of the famous Key West Aquarium, the Harry Truman Little White House, and the Shipwreck Historium Museum. Monday night join your friends for a fabulous dinner cruise featuring a delicious Cuban meal (adult drinks included) and live calypso music.

The convention officially begins Tuesday morning at 10:30, with the opening session. One of the highlights of this year's convention will be the key-note speaker, Wolfgang Grulke, author of *Nautilus: Beautiful Survivor*. Mr. Grulke gave up a successful business career to pursue his passion for all things nautilus; traveling the globe studying the living animals, fossils, and nautilus contributions to art and science. Following his presentation, meet Mr. Grulke at the NC Shell Club table where you can purchase his book and have it signed. All proceeds go to nautilus research.

An impressive list of speakers has been assembled for the week. Among them are Paul Callomon, Eugene Coan, Tom Eichhorst, Phil Fallon, José Leal, and Gary Schmelz. The range of topics is wide and interesting.

After lunch on Tuesday, native "Conch" Clinton Curry will present "A History of Key West - Its People and Places." Programs, silent auctions, and door prizes will continue throughout the afternoon.

The Jimmy Buffet-themed welcome party will be held in the pool area. The menu includes hamburgers, hot dogs, and chicken served from a grilling station with conch fritters and lots of side dishes. Drinks are available for purchase at the Tiki Bar. Entertainment will be a steel drum performer. For the first time ever, a special silent auction will be held during the welcome party, with a limited number of exclusive items usually reserved for the oral auction. This auction will last approximately two hours with payment and pick up at the conclusion of the welcome party.

Programs, door prizes, and silent auctions continue on Wednesday and Thursday. Wednesday night will be the much anticipated oral auction, featuring many of the best shells from the Frederic Weiss Collection. The convention concludes with the business meeting Thursday afternoon.

The sun sets on this COA convention with a gala celebration. The Cayo Hueso (Isle of Bones) banquet features Cuban/Caribbean cuisine with conch chowder, crab cakes, conch fritters, Caribbean chicken, pork loin, fried plantain, black beans and rice, and a cash bar. The featured speaker will be Rich Goldberg, who asks the question "What Were You Doing 37 Years Ago This Month? I was in Key West" In 1980 COA was only 8 years old but close to 200 members attended the convention in Key West. Rich will entertain us with stories and pictures from that event. Raffle ticket winners will be drawn, and table prizes and favors given out.

Friday at one o'clock the doors to the Bourse open; closing at 8:00 pm. Saturday hours are 9:00 am to 3:00 pm.

A closing look at COA Chicago - 2016

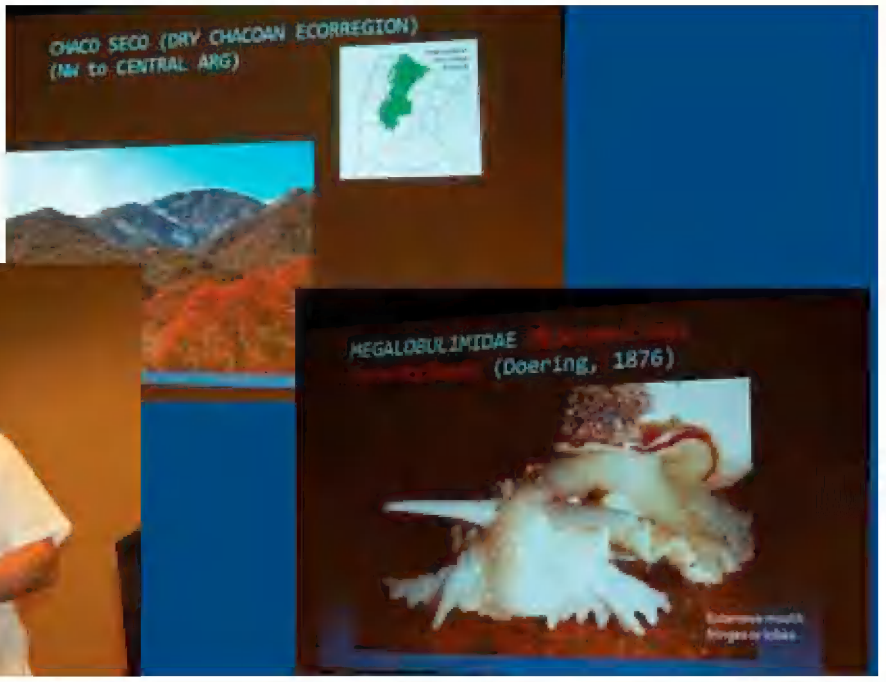
Photos by Carole Marshall, Lynn Funkhouser, Alice Pace, Sheila Nugent, Robert Gadbois & Rich Goldberg

The Crowne Plaza Hotel in Chicago – home for a week.

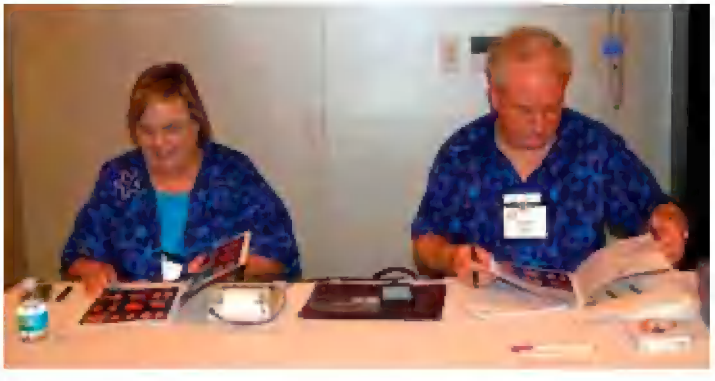
Greg Curie of Key West stops by a *T. rex* skull at the Field Museum. Greg is our host for the 2017 COA convention in Key West.

Attendees at the welcome party ate dinner with *T. rex* Sue at the Chicago Museum of Natural History.

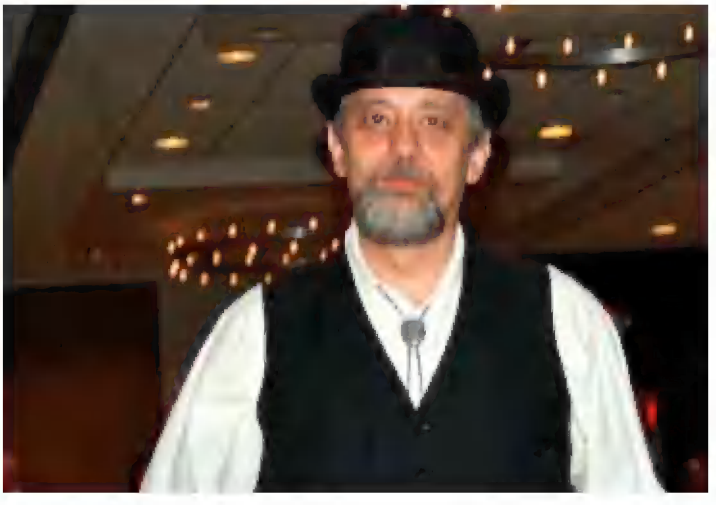
(Right & below): Stephanie Clark thanks Andres Bonard for his talk on collecting mollusks in Argentina. One of his slides (right) illustrated a living 80mm *Megalobulimus lorenzianus* (Doring, 1876), with the odd mouth flanges typical of that species.



(Left & above): Jochen Gerber led COA members on a behind-the-scenes tour of Chicago's world famous Field Museum of Natural History. One of the rarer holdings is a muff (above) made from the bysus of *Pinna nobilis* Linnaeus, 1758. This artifact lends a bit of credence to the theory that the "golden fleece" sought by Jason was in fact made of bysus threads.



Patty Humbird and Steven Coker get ready for the annual COA oral auction – lifeblood of our grant program.

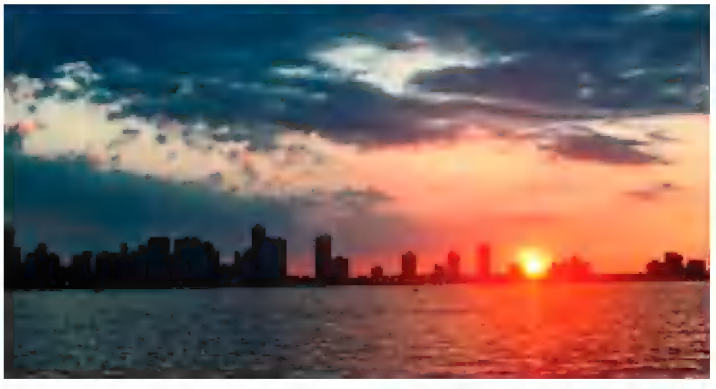


Paul Callomon pulled $1,000s from the audience during the oral auction.

G. Thomas Watters (right) with one of his slides (above) on Annulariidae biodiversity on Caribbean islands. His entertaining talk showed some of the 700 species in this family and their amazing sculpture – with differing spines, flanges, frills, and ridges.

Phyllis Gray, Bill & Carol Lyons, Jody & Dave Watts, and Alice & Bob Pace tour Chicago's Shedd Aquarium and pose with a mounted *Arapaima arapaima* Valenciennes, 1847, the world's largest freshwater fish, attaining lengths of almost 10 feet.

Jim & Linda Brunner enjoy the COA banquet, and like other attendees say goodbye to a great convention.



Sunset over Chicago on Lake Michigan.

COA *Neptunea* Award

The plans for the 2017 COA Convention in Key West, FL are being completed as we go to press. There will be many events throughout the week for everyone to enjoy. One of the events on the agenda is the annual COA *Neptunea* Award(s), and it is my privilege to call for nominations for 2017. The consensus of the COA Board is to reopen nominations with a "clean slate" annually. **Nominees not selected in previous years are certainly welcome for consideration if re-nominated - in fact their re-nomination is encouraged.** For the present cycle, nominations will close on June 1, 2017, so as to allow ample time for deliberation before the convention. **Please note that members of the Board of Directors are not eligible to receive the *Neptunea* Award while actively serving on the Board.**

By way of background, the *Neptunea* Award (Brunner, 2000; Lipe, 2000) was established at the midyear (1999-2000) meeting of the COA Board in order to recognize outstanding and distinguished service to conchologists and malacologists in recognition of:

1. Service to the Conchologists of America.

AND/OR
2. Service to the scientific interests of Conchologists of America.

AND/OR

3. Service to the science of Malacology as it applies to conchologists anywhere.

Although notable exceptions have been made, the COA Board, which serves as the jury for the *Neptunea* Award, has traditionally weighed its consideration for award recipients toward (1) amateurs: those not currently pursuing a principal career involving collection, study, or commerce of mollusks, (2) individuals "working behind the scenes" and relatively unrecognized in the COA world, for their contributions, and (3) active members of the COA. Up to three awards have been made at our annual conventions beginning with the Houston event in 2000 (see below). Nomination(s) for the *Neptunea* Award may be made by any COA member, and the format is simple:

Name of nominee:

This person deserves this award because (Here a somewhat detailed paragraph will suffice.)

..... Signed .....

and either snailmail or email that nomination to me, the new COA *Neptunea* Award Coordinator:

Everett Long
422 Shoreline Drive
Swansboro, NC 28584-7204
<nlong3@earthlink.net>

Previous *Neptunea* Award winners:

2000 (Houston, TX): Ross Gunderson, Ben and Josy Wiener, Debbie Wills
2001 (Port Canaveral, FL): Emilio Garcia, Harry Lee, Lynn Scheu
2002 (Sarasota, FL): Richard Petit, Bernard and Phyllis Pipher
2003 (Tacoma, WA) Jim and Linda Brunner, Kevin Lamprell, Doris Underwood
2004 (Tampa, FL): Bobbi Houchin
2005 (Punta Rassa, FL): Richard Forbush, Anne Joffe, William Lyons
2006 (Mobile, AL): Jack Lightbourn, Betty Lipe
2007 (Portland, OR): none given
2008 (San Antonio, TX): Bill Frank, Archie Jones
2009 (Clearwater, FL) none given
2010 (Boston, MA): none given
2011 (Port Canaveral, FL): Alan Gettleman
2012 (Cherry Hill, NJ): Gary Rosenberg, Martin Avery Snyder
2013 (Sarasota, FL): David and Lucille Green, Marlo Krisberg, and Charles Rawlings
2014 (Wilmington, NC): Colin Redfern, Tom Rice
2015 (Weston, FL) John and Cheryl Jacobs; Kevan and Linda Sunderland
2016 (Chicago, IL) Rich Goldberg, Homer Rhode, Charlotte Thorpe

Brunner, L., 2000. The *Neptunea* Award. *American Conchologist 28*(3): 3. Sept.
Lipe, B[etty], 2000. Presidents Message. *American Conchologist 28*(4): 2. Dec.

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American CONCHOLOGIST

Quarterly Journal of the Conchologists of America, Inc.

CONCHOLOGISTS OF AMERICA, INC.

In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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In This Issue

Front cover: *Simnia* sp. (6mm) photographed by Charles Rawlings at 75 feet depth on a small Alcyonacea (soft corals that used to be called gorgonians) on a steep slope of coral sand, silty sand and coral rubble, off Ambon, 2017.

Back cover: letter from COA President Harry Lee to each vendor at the 2017 COA Convention bourse, restating the COA policy towards molluscan conservation and the need for compliance with government regulations.

Editor's comments: This has been an interesting summer for COA. In the last two issues of *American Conchologist* (Vol. 44, no. 4, Dec 2016: 3 & Vol. 45, no. 1, March 2017: 36-37) I reported on efforts by COA to access the Frederic Weiss shell collection in time for the Key West convention. Thanks to Herculean efforts by Donald Dan (in both time and money) and some timely volunteer help, this valuable collection will be featured at Key West, with plenty left over for the next couple of conventions. I think all COA members realize the value of such collections to COA - both in funding our grant program for molluscan research and ensuring that a well-curated collection does not go to waste in a garage sale or to fill large decorative jars. During all of this, it came to light that COA needs a written process to guide us in accessing such a collection. Receiving such "gifts-in-kind" is not a simple process. There are legal ramifications as well as concerns about how our organization handles such matters. These issues were brought to the attention of COA President Harry Lee. He not only agreed on the need for such a document, but also suggested a codified *COA Code of Ethics*. To this end, he set up two *ad hoc* committees to research and prepare the necessary documentation, one for each product:

COA Code of Ethics

Jose Leal (Chair)	RichardKirk
Tom Eichhorst	Steven Coker (*ex officio*)
Tom Grace	Harry Lee (*ex officio*)

Gifts-in-Kind

Bob Janowsky (Co-chairman)	Doug Wolfe
Donald Dan (Co-chairman)	Steven Coker (*ex officio*)
Gary Rosenberg	Harry Lee (*ex officio*)

Both committees completed their tasks in a timely fashion and the final products were voted on and approved by the COA Board of Directors. President Harry Lee personally thanked all of the *ad hoc* committee members for both stepping up to the task when asked and for producing quality products. These documents are included in this issue of *American Conchologist* for dissemination to the COA membership (see pages 38-42 & back cover). Also included (back cover) is a copy of a letter from COA President Harry Lee to each vendor at the 2017 COA Convention bourse. This letter welcomes the vendors as the highlight of the convention and restates COA policy toward molluscan conservation and the need to be aware of and in compliance with "...any governmental regulation, US or overseas, that may impact your bourse activities." COA recently published *American Conchologist Supplement no. 1*: 1, 3-32. January 2017. Written by Doug Wolfe and Harry Lee, this resource is intended to help members and responsible agencies become aware of some of the myriad of regulations and policies concerning molluscan conservation. The efforts by the COA Board of Directors and many concerned members will surely improve the COA organization and help guide us into the future.

There was a minor event last year

Thomas Eichhorst

Introduction

There was a minor event last year (2016) that went unnoticed by most people, and even if a few people did read about it, its importance went unremarked by most. You see, in 2016, the last, I repeat, the last, *Partula faba* (Gmelin, 1791) died (Gerlach, 2016). The loss of a small (25mm or so), nondescript brown land snail is hardly front page (or any page for that matter) news, but maybe it should have been. Why? Well, there are a number of reasons, not the least of which is that humans caused this extinction through ignorance, greed, perfidy, incompetence, and maybe a bit of bad luck. Again, so what? Read on.

The family Partulidae Pilsbry, 1900, is found throughout the islands of the Pacific and, until relatively recently, has coexisted and thrived alongside humans for thousands of years. The family has five genera (some authorities cite only three or four, with up to a dozen subgenera – not used here) with fewer than 115 valid named species, of which many (almost 50%) are now extinct in the wild (Gerlach, 2016; WoRMS, 2017). The largest genus, *Partula* (with about 82 species), was concentrated in the Society Islands, French Polynesia, with perhaps 61 valid species in the Society Islands alone (Cowie, 1992).

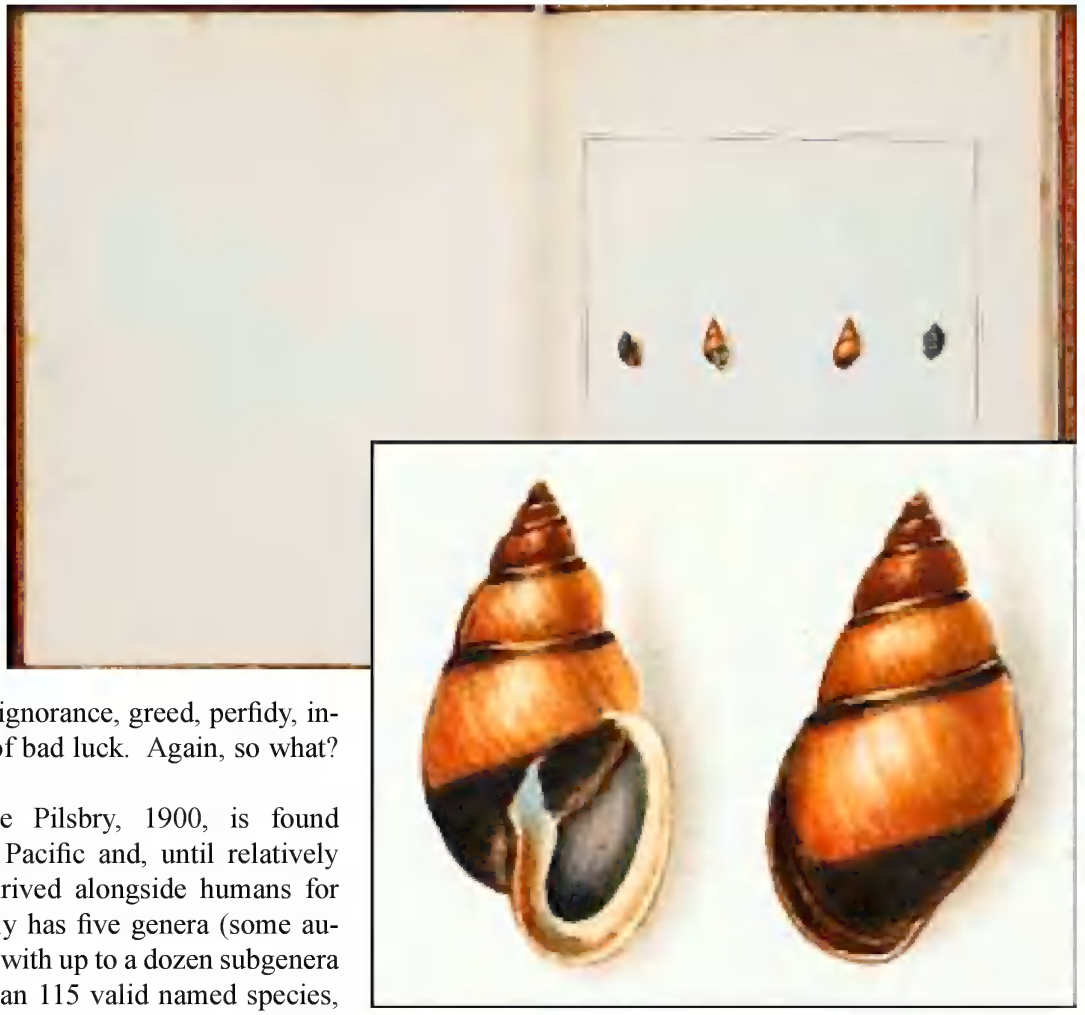

Fig. 1. As can be seen above, Thomas Martyn devoted plenty of space for his near life-size shell depictions in his self-published *Universal Conchologist*. His use of color and details of shell structure were exacting – far better, in fact, than the much more famous volumes on shells that followed 50 years later. He also positions his shells spire upwards, a convention that did not appear in general use until about 1840. The illustrated shell is his *Limax faba*, later *Partula faba* (Gmelin, 1791).

Partulid Taxonomic History

The first described species in Partulidae was *Partula faba* (Gmelin, 1791) – yes, the same species now extinct. It was originally described by Thomas Martyn (1735-1825) from shells brought back from Raiatea by the *HMS Endevour*, under the command of Captain James Cook (1728-1779) (Lee, 2012). In his *Universal Conchologist*, Martyn named his shell *Limax faba* Martyn, 1784 (Fig. 1). This superbly illustrated but obscure publication has been noted for, "its range of content and the beauty of its production [that] make it the greatest of all shell books" (William, 2015). Because his work was not universally binominal, the ICZN ruled most of the names (including *Limax faba*) as unavailable in 1957 (Lee, 2012; ICZN, 1957). Interestingly, after numerous firsts in the Pacific and circumnavigating the globe, the *HMS Endevour* was sold and ended up under the new name *Lord Sandwich*, serving as a contract troop carrier for Britain during the American Revolutionary War. It was scuttled in a blockade off Rhode Island in 1778, where it was never recovered.

Gmelin (1748-1804) was the next to publish the name, as *Helix faba* Gmelin, 1791, thus he becomes the au-

***Partula faba* (Gmelin, 1791), 25mm, once found by the thousands on Raiatea, was the first species described in the family Partulidae. This species occured as both the banded morph (shell on the left, courtesy of Harry Lee, see Lee, 2012) and the solid colored morph (author's collection). The last *Partula faba* died in captivity in 2016.**

Partulidae

- ***Partula*** Férussac, 1821 (82+, Society Islands, Belau Islands & New Guinea)
- ***Samoana*** Pilsbry, 1909 (21, Polynesia & the Mariana Islands)
- ***Palaupartula*** Pilsbry, 1909 (3, Belau Islands)
- ***Eua*** Pilsbry & Cooke, 1934 (4, Tonga & Samoa)
- ***Sphendone*** Slapoinsky & Kraus, 2016 (1, Belau Islands)

Table - 1. A notional tree of the Partulidae. The number of species and principal range is shown in parenthesis.

thor of record with his name and date, now in parentheses because the genus was subsequently changed to *Partula*. So reason number one for concern about this extinction is that we have lost the first species described in the family. That is a noteworthy event.

After *Partula faba* was named, other malacology notables became involved with this land snail family (land snail used here as including tree snails). *Partula otaheitana* (Bruguière, 1792) (as *Bulimis otaheitana*) was named by the French malacologist Jean Guillaume Bruguière (1749-1798) (Fig 2) a year after the Gmelin species – also from material brought back by Captain Cook. Over twenty years later

Fig. 2. Jean Guillaume Bruguière (1749-1798).

the French naturalist Baron André Étienne Justin Pascal Joseph François d'Audebert de Férussac (1786-1836) named *Partula gibba* Férussac, 1821, and *Samoana fragilis* (Férussac, 1821). Like these other early names, subsequent authors renamed them any number of times. Quite a few years went by before French surgeon, naturalist, herpetologist, and ornithologist Dr. René Primevere Lesson (1794-1849) (Fig. 3), named three *Partula* species in 1831 (*Partula grisea* Lesson, 1831 & *Partula rufa* Lesson, 1831, are still valid) (WoRMS, 2017). He collected from South Pacific islands in the 1820s while serving on the

Fig. 3. Dr. René Primevere Lesson (1794-1849).

Fig. 4. Hugh Cuming (1791-1865).

Fig. 5. William John Broderip (1789-1859).

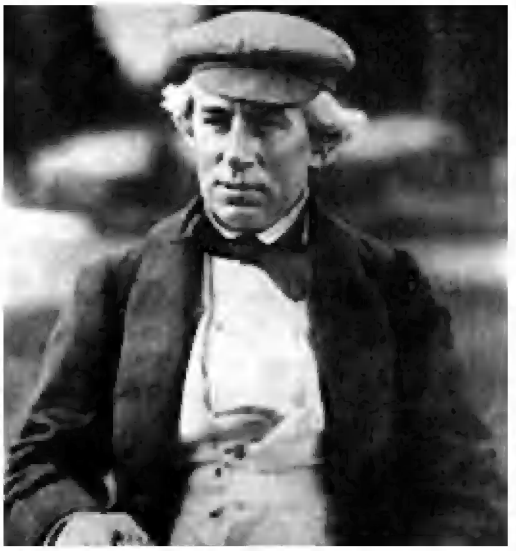

Fig. 6. Lovell Augustus Reeve (1814-1865).

French Corvette *La Coquille.*

In the mid 1820s, English collector Hugh Cuming (1791-1865) (Fig. 4) amassed a prodigious amount of natural history specimens from Pacific Islands. He made his mollusk collection available to a number of malacologists of that era. Partulidae supplied by Cuming were named by English lawyer and naturalist William John Broderip (1789-1859, named 3) (Fig. 5) and English lawyer and naturalist WIlliam John Broderip (1789-1859, Fig. 5), who named three; English conchologist and publisher Lovell Augustus Reeve (1814-1865, Fig. 6), who named five, three still valid; and German physician, botanist, and conchologist Ludwig Karl Georg (Louis) Pfeiffer (1805-1877, Fig. 7), who named 24, 16 still valid. (Fig. 7).

A little more than 10 years after Pfeiffer's efforts, there were a number of malacologists naming and describing Partulidae. Perhaps most notable were the Americans Andrew Garrett (1823-1887) (Fig. 8) and William Harper Pease (1824-1871). Garrett lived and collected throughout the South Seas for Louis Agassiz of Harvard College from 1856-1872 and later for the Museum Godeffroy in Hamburg, Germany, between 1872-1875. The museum also operated as a natural history store and closed in 1885. A great number of natural history objects from this museum exist today in other European museums.

Garrett lived on a number of different islands and was friends with William Harper Pease. Garrett supplied Pease with a great number of mollusk specimens, including Partulidae. Pease (relatively unknown except for his published works and shell library) published names for these in the mid 1860s to the early 1870s (Kay & Clench, 1975). After Pease's death, Garrett also published a few works, some of which were based on unpublished manuscripts by Pease (Lee, 2012; Gerlach, 2016). Altogether, Pease named some

Fig. 7. Ludwig Karl Georg (Louis) Pfeiffer (1805-1877).

Fig. 8. Andrew Garrett (1823-1887) (circa 1868, archives of the Museum of Comparative Zoology, Harvard University), from Smithsonian National Museum of Natural History. Can also be found online in error as a photograph of W.H. Pease.

Fig. 9. Patulids on the underside of a large leaf, Saipan, July 1920, from Crampton, 1925. Wikipedia.com.

Fig. 10. The 1881 publication (left) by William Dell Hartman that proved key to the subsequent publications by Henry Edward Crampton and Charles Montague Cooke Jr.

Fig. 11. Henry Edward Crampton (1875-1956).

Fig. 12. Charles Montague Cooke Jr. (1874-1948).

31 valid partulid species (most provided by Garrett from the Society Islands) and Garrett named 11, of which 9 were based on Pease manuscripts (Lee, 2012). Garrett's *The terrestrial Mollusca inhabiting the Society Islands* of 1884 was by far the best reference for the many *Partula* species of that island group, until the recently published *Icons of Evolution*: *Pacific Island tree snails, family Partulidae* by Gerlach (2016).

In the years following the works by Pease and Garrett, there were a number of authors describing new partulids and drawing some important conclusions about these Pacific island snails. Because of Cuming, Garrett, and Pease, major collections of partulids were established at a number of museums (Zoologisches Museum Hamburg; Natural History Museum, London; Museum of Comparative Zoology, Harvard; Bernice Puahi Bishop Museum, Hawaii; Carnegie Museum of Natural History, Pittsburgh; Academy of Natural Sciences, Philadelphia; and the American Museum of Natural History, New York) – an invaluable resource for later researchers (Gerlach, 2016). Two of the later researchers of note were William Dell Hartman (1817-1899, described six partulid species) and Alfred Goldsborough Mayer (1868-1922). Both of these individuals used field collecting as well as museum specimens to derive some taxonomic order to what was up-to-then a confusing morass of valid names and synonyms applied to Partulidae in an almost haphazard manner. Hartmann (1881) (Fig. 10) used his own material as well as museum specimens to bring some order to the Partulidae, grouping like specimens into genera and subgenera. He later dropped the subgenera as being of insufficient importance (and many were preoccupied names and unavailable) to the understanding of the partulid family (Gerlach, 2016). Mayer (1902) argued that using shell shape, color, and form of adult partulid shells (the norm of the time) was insufficient for determining inter-species relationships (Gerlach, 2016).

Preeminent among partulid researchers was Henry Edward Crampston (1875-1956) (Fig. 11), a paleontologist, evolutionary biologist, and malacologist from Columbia University and Barnard College. Crampston made 12 expeditions to the Society Islands as well as Guam and Saipan in the Mariana Islands. He was greatly influenced by the ordered approach of Hartman and the relationship questions of Mayer. He wrote several comprehensive volumes on the natural history and evolution of partulid snails and published a couple of papers with Charles Montague Cooke Jr. (1874-1948) (Fig. 12), a Hawaiian malacologist from a wealthy and famous Hawaiian family. Cooke also worked with the indefatigable Henry Augustus Pilsbry (1862-1957) from the Academy of Natural Sciences, Philadelphia, on Hawaiian

Fig. 13. Dr. Justin Gerlach and his *Icons of Evolution: Pacific Island tree snails, family Partulidae* (2016). This book brings our knowledge of the Partulidae up-to-date. See the review on page 28.

land snails. While Pilsbry named only three partulid species, one with Cooke, he did name the family – Partulidae. Crampston's primary interest with partulid snails was with taxonomy (Hartman's influence) and Mendelian inheritance (Mayer's influence) (Gerlach, 2016). His rather lengthy and very complete publications demonstrated evolution and speciation in partulids from valley to valley. Unfortunately he died with much of his work on several islands still unpublished (Gerlach, 2016). Crampston estimated that in the course of his research he collected some 400,000 specimens. He named 40 partulid species, 19 with Cooke, 26 valid. Crampston's work using exacting species descriptions and his use of statistics is common today, but at the time it was revolutionary (Gerlach, 2016).

One hundred years after Crampston's seminal volume, *Studies on the variation, distribution and evolution of the genus* Partula. *The species inhabiting Tahiti* (1916), Justin Gerlach published *Icons of Evolution*: *Pacific Island tree snails, family Partulidae* (2016) (Fig. 13). The Gerlach work completes, closes out, and updates Crampston and other previous partulid authors. This one work addresses the Partulidae as no other volume has done before. Taxonomy, synonymy, history, natural history, ecology, evolution, etc., all are covered island by island – a most thorough coverage of a complex and vexing family of land snails. Questions and issues remain, but even these are addressed as problems still to be solved.

Partulid Natural History

Partulidae are often found isolated between ridges on the different islands they inhabit. Human pressure in the form of habitat loss began affecting the snails in the 20th century, but the death knell was the introduction of the carnivorous wolfsnail, *Euglandina rosea* (Férussac, 1821), in the late 1950s to early 1970s. A couple decades earlier, the giant African snail, *Lissachatina fulica* (Férussac, 1821), previously known as *Achatina fulica*, had been imported to the Society Islands. The resulting calamitous string of events happened before, but no lessons were apparently learned.

In 1936 *Lissachatina fulica* was inadvertently introduced onto Hawaii. It was discovered in 1938 and despite various attempts at eradication, the rapacious snails spread from Maui to Oahu, and from Kauai to Hawaii (a separate infestation). Some 30 species of snail predators were brought to Hawaii to determine which one(s) would be most effective in controlling the giant African snail (Davis & Butler, 1964). According to Davis & Butler (1964), three snail predators were deemed most effective and were propagated and released, rather widely – *Gonaxis quadrilateralis* (Preston, 1910), *Gonaxis kibweziensis* (Smith, 1894), and *Euglandina rosea*. In 1955 authorities released 616 *Euglandina rosea* on Oahu and three years later harvested 12,000 of these predator snails on Oahu for release on other Pacific islands (Gerlach, [2015]). Two decades after the initial Hawaiian release there was no substantial proof that these predators were having any effect on *Lissachatina fulica*, prompting some scientists to advise authorities to use caution against this method of control in the future (Christensen, 1984). Within a couple of years there were some 56 Hawaiian land snails (Amastridae and Achatinellidae) thought extinct or near extinction due primarily to predation by *Euglandina rosea* (Hadfield, 1986; Cowie, 1992; Régnier et al., 2009).

Sadly, at about the same time these predatory snails were released in Hawaii, authorities on Guam released the same three snails for the same reason – *E. rosea* was released in 1957, *G. kibweziensis* in 1954, and *G. quadrilateralis* in

Fig. 14. Guam partulids: 1. *P. gibba* (critically endangered), 2. *Partula langfordi* (neighboring island, extinct), 3. *Partula radiolata* (critically endangered), and 4. *Samoana fragilis* (critically endangered). *P. salifana* (extinct) not shown. Dave Hopper, US Fish & Wildlife, Wiki.com.

Fig. 15. The giant African snail, *Lissachatina fulica*, introduced throughout the Pacific (and in the last few years in Florida as well). Attempts to control this snail through the introduction of predatory snails has led to widespread devastation in other land snail families. Photo by Alexander R. Jenner, Wikipedia.com.

Fig. 16. The misguided introduction of the rosy wolfsnail, *Euglandina rosea*, to control the giant African snail has proven disastrous to native snail species throughout the Pacific. Photo by Dan Parker on Wikipedia.com.

1967 (Eldredge, 1988 (not seen); Hopper & Smith, 1992) (the results on the partulid populaton were predictable, Fig. 14).

With seemingly no consideration of the Hawaiian experience, *Euglandina rosea* was introduced in the early 1990s into the Society Islands as a means of control for *Lissachatina fulica*. Within 10 years 51 species of endemic partulid snails were extinct (Coote & Loève, 2003). To be sure, habitat loss and heavy collecting pressure (many of these snails were used for islander jewelry – leis) must have also had some effect, but the rapid extinction of the Partulidae seemed a direct result of the introduction of *Euglandina rosea* (Cowie, 1992; Coote & Loève, 2003; Régnier, 2009).

So, reason number two for concern over the extinction of the very last *Partula faba*, centers around the fact that this species and other partulid snails are now extinct because of man's ill-thought-out intervention. And reason number three for concern is that we caused the extinction of a number of other partulid species. We were now working on the extinction of an entire family, rather than just a single species. Intentional and ill-advised changes in the ecosystem had unintended but predictable results. Authoritative hubris and at best ignorance, at worst a callous lack of regard, killed these snails. To date, the exact relationship and dynamics of gastropod predator and gastropod prey is poorly understood, at best. The evidence, although damning, is largely circumstantial (Barker & Efford, 2004). What is known is that predatory gastropods are polyphgous – that is they can and will prey upon multiple species (Barker & Efford, 2004).

Other Molluscan Extinctions

This is all, of course, part of a larger whole. One study demonstrated that while there were 278 molluscan extinctions listed by the IUCN Red List in 2007, there were another 288 molluscan extinctions not yet listed (Régnier et al., 2009). The U.S. has the world's most varied and most numerous freshwater mussel or unionid population. Yet of the 300 species found in the U.S., river impoundment, pollution, and invasive species introduction have resulted in 52% of these species now recognized by the Nature Conservancy as endangered or extinct (Williams et al., 2008). A more recent study of molluscan extinctions found, "...638 species as extinct, 380 as possibly extinct, and 14 as extinct in the wild, a total of 1,032 species in these combined categories, and more than twice as many as listed by IUCN in these categories." (Cowie et al., 2017: 3) Similar accounts can be found for Europe and Asia (Régnier et al., 2009). So, what can be done? What should be done? For freshwater systems the obvious solution is to take due diligence when altering freshwater systems and to halt pollution. Outside of a classroom environment these solutions prove extremely difficult to implement. Monetary and political obstructions often make altering the status quo almost impossible. As for introduced exotic species like the zebra mussel, *Dreissena polymorpha* (Pallas, 1771), not much can seemingly be done. Poisonings have eliminated the zebra mussel from controlled areas, but only for a limited time and at an unknown expense to other life in the water system (Mackie et al., 1989). Probably someone is, at this very moment,

Fig. 17. Captive breeding programs established to save the partulid snails were only partially successful. Although some species flourished, many of the snails did not survive in captive conditions. Photo anon.

Fig. 18. The New Guinea flatworm, *Platydemus manokwari*, may actually control the giant African snails and even the rosy wolfsnail, but at what cost? This voracious predator is almost certain to bring to end the last partulids. Photo by Shinji Sugiura on Wikipedia.com.

Fig. 19. *Partula* sp. and young in the breeding program at Edinburgh Zoo, Scotland. Iamage is a video capture from RZSS Conservation Projects.

considering a biological control, such as a rapacious predator species – despite the lessons of Hawaii and French Polynesia.

Attempts at Partulid Conservation

For the Partulidae, scientists decided to attempt a last ditch effort to capture as many island partulids as possible for captive breeding programs – with the thought of eventually repatriating the snails back to their home islands or other similar island habitats. Partulid conservation breeding programs to date have involved 41 species, in 15 zoos and institutions across Europe and the U.S., with most attempts begun in the early 1990s (Fig. 17). A snapshot look at the 2015 numbers shows that only 13 of the 41 species are still viable (Gerlach, 2016). The reasons for the failed attempts are varied and suppositional, including: disease, bacterial and parasitical infections, climate problems, unknown feeding requirements, etc. What is known is that various populations at various zoos and breeding centers had decreasing egg fecundity and high rates of adult and neonatal mortality that could not be overcome in a numbert of partulid species (Gerlach, 2016).

Of the eight *Partula* species once found on Moorea Island, French Polynesia, all but one are gone from the wild (Gerlach, 2014). Four have flourished in captive breeding programs, four perished in these programs. As some indication of the difficulties faced in maintaining *Partula* in captivity, one of the snails was carnivorous (now extinct, it was one of only two carnivorous partulids), other island partulids were ominvores, still others were specialized detritivores and fungal grazers, and others were herbivores (Gerlach, 2014). The single remaining partulid on Moorea is *Partula taeniata*, which is a detritivore and herbivore and was once spread throughout the island with the greatest range of any of the partulids. It is now known only from a few small relic populations in restricted habitats (Gerlach, 2014).

Attempts to reintroduce those few successfully captive bred populations have been, for the most part, unsuccessful. And we thus come to reason number four to be concerned about the extinction of this small brown snail. Even when we tried, we did not know enough about these snails to keep them alive. We have lost many of them forever, before ever learning much more about them than a label attached to a dry empty shell. As a final note, there has been some work done freezing snail samples to preserve the DNA for possible future use.

The End Game

Ironically and in a case of adding insult to injury, *Euglandina rosea* is now falling prey to a predator itself. The New Guinea flatworm, *Platydemus manokwari* De Beauchamp, 1963, is a voracious predator of land snails

and other invertebrates (Fig. 18). The flatworm has been introduced to many of the islands where partulid snails once flourished. Most of these introductions were accidental, but at least a couple were again an ill-thought-out attempt at biological control. The flatworm does indeed prey upon the wolfsnail, *Euglandina rosea*, the giant African snail *Lissachatina fulica*, and *Gonaxis* spp. *Platydemus manokwari* was introduced on the Mariana Islands in 1978 and by 1992 had reduced the population of *Lissachatina fulica* by 95% (Hopper & Smith, 1992). Two decades later it appeared to have eliminated both *Euglandina* and *Gonaxis* spp. (Keer, 2013). At the same time this rapacious predator may finally push the few remaining partulids into extinction.

It has been stated that "all species go extinct". This is a dry truism that is often incorrectly interpreted, causing many to miss the point. "All species go extinct" does not mean we should shrug off the extinction of an 'unimportant' invertebrate species. It does mean that for 4.55+ billion years, life on earth has been evolving and new species have supplanted the old – natural selection. For the first time however, there is a species (*Homo sapiens*) that can cause localized extinctions as well as widespread extinctions. Admittedly (and hopefully) we can also maybe prevent them. We have done both, but surely we excel at the former rather than the latter.

Partula faba, the first described of its family is extinct – a notable event (reason one). This extinction was human caused – a notable event (reason two). This human driven extinction has to date caused the extinction of almost 50% of the species in the family Partulidae – a notable event (reason three). As we watched this extinction taking place, we were not smart enough, we did not know enough about the entities involved, to reverse it – notable event (and reason four). For most of us this information probably pales in comparison to global warming, the decimation of African mammal species, and the bleaching of coral reefs – but it is all part and parcel of the same. We can do better; we have to do better.

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Table-2. Partulidae status

Species (**bold IUCN Red List**) Status (date last assessed) Locality

Eua expansa (Pease, 1872) endangered
(2016) Samoa

***Eua globosa* Pilsbry & Cook, 1934** possibly extinct
(2011) Eua Is, Tonga

Eua montana (Cooke & Crampton, 1930) endangered
(2016) Samoa

***Eua zebrina* (Gould, 1847)** endangered
(1996) American Samoa

***Palaopartula calypso* (Semper, 1865)** critically endangered
(2011) Palau

***Palaopartula leucothoe* (Semper, 1865)** possibly extinct
(2011) Palau

***Palaopartula thetis* (Semper, 1865)** endangered
(2011) Palau

***Partula affinis* Pease, 1868** critically endangered
(2007) Tahiti

***Partula arguta* (Pease, 1864)** extinct
(2007) Society Is.

Partula assimilis Pease, 1868 vulnerable
(2016) Cook Is.

***Partula atilis* Crampton, 1956** extinct
(2007) Society Is.

***Partula auraniana* Hartman, 1888** endangered
(2011) Vanuatu

Partula aurantia Crampton, 1932 extinct
(2016) Moorea Is.

***Partula auriculata* Broderip, 1832** extinct
(2007) Society Is.

***Partula bilineata* Pease, 1866** extinct
(2007) Society Is.

***Partula callifera* L. Pfeiffer, 1856**
(as *Partula dentifera callifera*) extinct
(2016) Society Is.

***Partula candida* Crampton, 1956**
(as *Partula dentifera candida*) extinct
(2016) Society Is.

***Partula cedista* Crampton, 1956**
(as *Partula dentifera cedista*) extinct
(2016) Society Is.

***Partula citrina* Pease, 1866**
(as *Partula dentifera citrina*) extinct
(2016) Society Is.

***Partula clara* Pease, 1864** critically endangered
(2007) Society Is.

Partula clarkei Gerlach, 2016 extinct
(2016) Society Is.

Partula compressa Reeve, 1850 probably extinct
(2016) Society Is.

Partula cootei Gerlach, 2016 extinct
(2016) Society Is.

***Partula cramptoni* Clench, 1941** vulnerable
(2016) Solomon Is.

***Partula crassilabris* Pease, 1866** extinct
(2007) Society Is.

***Partula cuneata* Crampton, 1956** extinct
(2007) Society Is.

***Partula cytherea* Cooke & Crampton, 1930** extinct
(2007) Society Is.

***Partula dentifera* L. Pfeiffer, 1852** extinct in the wild
(2007) Society Is.

Partula desolata Bauman & Kerr, 2013 prehistoric extinct
(2016) Mariana Is.

Partula diminuta C.B. Adams, 1851 extinct
(2016) Society Is.

***Partula dolichosotma* Crampton, 1956** extinct
(2007) Society Is.

***Partula dolorosa* Crampton & Cooke, 1953** extinct
(2007) Society Is.

***Partula emersoni* Pilsbry, 1913** critically endangered
(2011) Micronesia

***Partula eremita* Crampton & Cooke, 1953** extinct
(2007) Society Is.

***Partula faba* (Gmelin, 1791)** extinct
(2016) Society Is.

***Partula flexuosa* Hartman, 1885** least concern
(2016) Solomon Is.

***Partula formosa* (Garrett, 1884)**
(as *Partula dentifera formosa*) extinct
(2016) Society Is.

***Partula garretti* Pease, 1864** extinct in the wild
(2016) Society Is.

***Partula gibba* Férussac, 1821** critically endangered
(2007) Guam

Partula grisea Lesson, 1831 least concern
(2016) New Guinea

***Partula guamensis* L. Pfeiffer, 1846** extinct
(2016) Micronesia

***Partula hebe* L. Pfeiffer, 1846** extinct in the wild
(2016) Society Is.

***Partula hyalina* Broderip, 1832** vulnerable
(2007) Society Is.

***Partula imperforata* Pease, 1884**
(as *Partula dentifera imperforata*) extinct
(2016) Society Is.

Partula incrassa Crampton, 1916 extinct
(2016) Moorea Is.

***Partula jackieburchi* (Kondo, 1980)** extinct
(2007) Society Is.

***Partula labrusca* Crampton & Cooke, 1953** extinct
(2007) Society Is.

***Partula laevistriata* Crampton, 1956** extinct
(2007) Society Is.

Partula lanceolata Cooke & Crampton, 1930 vulnerable
(2016) Fiji

***Partula langfordi* Kondo, 1970** extinct
(2016) Mariana Is.

Partula leefei E.A. Smith, 1897 critically endangered
(2016) Fiji

***Partula leptochila* Crampton, 1956** extinct
(2007) Society Is.

Partula levistrata Crampton, 1956 extinct
(2016) Society Is.

Partula lirata Mousson, 1865 vulnerable
(2016) Fiji

***Partula lugubris* Pease, 1864** extinct
(2007) Society Is.

***Partula lutea* (Lesson, 1831)** extinct
(2007) Society Is.

Partula magistri Gerlach, 2016 extinct
(2016) Society Is.

Partula makatea Gerlach, 2016 prehistoric extinct
(2016) Tuamotu Is.

***Partula meyeri* (Burch, 2007)** critically endangered
(2011) Society Is.

***Partula micans* L. Pfeiffer, 1853** least concern
(2011) Solomon Is.

***Partula mirabilis* Crampton, 1924** extinct in the wild
(2007) Moorea Is.

***Partula mooreana* Hartman, 1880** extinct in the wild
(2007) Moorea Is.

***Partula navigatoria* (L. Pfeiffer, 1849)** extinct
(2007) Society Is.

***Partula nodosa* L. Pfeiffer, 1851** extinct in the wild
(2007) Society Is.

Partula obesa Pease, 1868 critically endangered
(2016) Mariana Is.

***Partula otaheitana* Bruguière, 1792** critically endangered
(2007) Society Is.

Partula pacifica L. Pfeiffer, 1854 critically endangered
(2016) Vanuatu

Partula pearcekellyi Gerlach, 2016 extinct
(2016) Society Is.

***Partula planilabrum* Pease, 1864** extinct
(2007) Society Is.

***Partula producta* Pease, 1864** extinct
(2007) Society Is.

***Partula protracta* Crampton, 1956** extinct
(2007) Society Is.

Partula pyramis Hartman, 1886 critically endangered
(2016) Vanuatu

***Partula radiolata* (L. Pfeiffer, 1846)** critically endangered
(1996) Guam

Partula radiosa (L. Pfeiffer, 1854) vulnerable
(2016) Vanuatu

***Partula raiatensis* Garrett, 1884**
(as *Partula dentifera imperforata*) extinct
(2007) Society Is.

***Partula remota* Crampton, 1956** extinct
(2007) Society Is.

***Partula rosea* Broderip, 1832** extinct in the wild
(2007) Society Is.

Partula rufa Lesson, 1831 extinct (?)
(2016) Society Is.

***Partula sagitta* Crampton & Cooke, 1953** extinct
(2007) Society Is.

***Partula salifana* Crampton, 1925** extinct
(1996) Guam

***Partula similaris* Hartman, 1886** least concern
(2016) Papua New Guinea

***Partula suturalis* L. Pfeiffer, 1855** extinct in the wild
(2016) Moorea Is.

***Partula taeniata* (Moerch, 1850)** critically endangered
(2007) Moorea Is.

***Partula tohiveana* Crampton, 1924** extinct in the wild
(2016) Moorea Is.

***Partula tristis* Crampton & Cooke, 1953** extinct
(2016) Society Is.

Partula turgida Pease, 1864 extinct
(2016) Society Is.

***Partula umblicata* Pease, 1866** extinct
(2007) Society Is.

Partula vanikorensis Quoy & Gaimard, 1832 vulnerable (2016) Solomon Is.

***Partula varia* Broderip, 1832** extinct in the wild (2007) Society Is.

***Samoana abbreviata* (Mousson, 1869)** crit. endangered (2007) American Samoa

Samoana alabastrina (L. Pfeiffer, 1857) vulnerable (2016) Fiji

***Samoana annectens* (Pease, 1865)** critically endangered (2016) American Samoa

***Samoana attenuata* (Pease, 1865)** critically endangered (2007) Society Is.

***Samoana bellula* (Hartman, 1885)** critically endangered (2007) Marquesas Is.

***Samoana burchi* Kondo, 1973** critically endangered (2011) Society Is.

***Samoana conica* (Gould, 1848)** endangered (1996) American Samoa

***Samoana cramptoni* Pilsbry & Cooke, 1934** crit. endangered (2011) Tonga

***Samoana decussatula* (L. Pfeiffer, 1850)** crit. endangered (2007) Marquesas Is.

***Samoana diaphana* (Crampton & Cooke, 1953)** endangered (2007) Society Is.

***Samoana dryas* (Crampton & Cooke, 1953)** crit. endangered (2007) Raivavae, Austral Is.

***Samoana fragilis* (Férussac, 1821)** critically endangered (2016) Guam

***Samoana ganumedes* (L. Pfeiffer, 1846)** critically endangered (2016) Marquesas Is.

Samoana gonochila (L. Pfeiffer, 1847 critically endangered (2016) Marquesas Is.

***Samoana inflata* (Reeve, 1842)** extinct (2016) Marquesas Is.

***Samoana margaritae* (Crampton & Cooke, 1953)** vulnerable (2007) Rapa, Austral Is.

Samoana medana Kondo & J.B. Burch, 1989 crit. endangered (2016) Marquesas Is.

Samoana minuta (L. Pfeiffer, 1857) extinct (?) (2016) Marquesas Is.

Samoana pilsbryi Gerlach, 2016 extinct (?) (2016) Marquesas Is.

Samoana stevensoniana (Pilsbry, 1909) crit. endangered (2016) Samoa

***Samoana thurstoni* (Cooke & Crampton, 1930)** endangered (2000) American Samoa

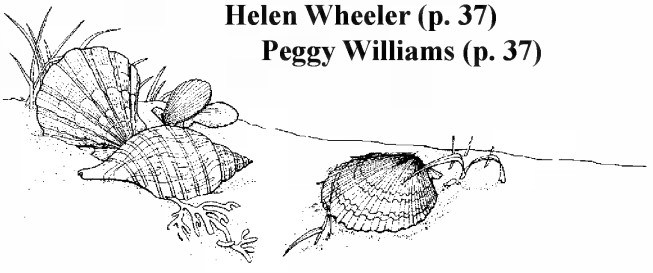
Sphendone insolita Slapcinsky & Kraus, 2016 vulnerable (2016) Palau

Table-2. Partulidae status according to the IUCN Red List, WoRMS (2017) & Gerlach (2016). Species in **bold type** are those listed by the IUCN. This list was then corrected using Gerlach (2016) and WoRMS (2017). The date in parentheses after the species status is the date this species was last assessed. If the date is 2016, this means that either the species was not listed by the IUCN (the name is in regular type rather than bold type) or the listing was incorrect and was corrected from data in Gerlach (2016). Note that the vast majority of IUCN listed species were last assessed in 2007. Thus a decade has passed since the last species assessment and the status has very likely changed. The most current and complete data about Partulidae is found in Gerlach (2016).

In Memoriam error (last issue)

In the last issue, the "In Memoriam" listing for **Debbie Freeman** had an incorrect photograph. The photo shown as Debbie was actually Linda Foreman, who was probably not all that thrilled to be listed by mistake as we tried to say goodbye to Debbie. *Mea culpa.* The text that accompanied the listing was apparently correct. So here is the real Debbie, who volunteered for the less-than-enjoyable job of COA Membership Chair, even though she was dealing with serious health issues. Thank you Debbie, I'll miss your emails and your ever present humor about the often silly issues involved with our COA duties. God bless.

In Memoriam:



Broward Shell Club: a success story

Nancy Galdo

In the last issue (*American Conchologist* (45-1) 1 March 2017: 28-29), I reported on the Broward Shell Club annual Shell Show, 14-15 January 2017. I had lots of images, including Doug Thompson with his COA Award, as well as plenty of dry facts, such as 332 feet of exhibit space and 28 different scientific entries. I listed most of the winning entries in the scientific division, as well as the scientific judges: José Leal and Rich Kirk, plus the Show Chairperson: Alice Pace. This information and the images were all kindly provided by club member Nancy Galdo (co-publicity person with Richard Kent). I usually crowd shell show results into a single page, but Nancy sent so much material that I expanded it to two pages (as I did for the Sarasota Shell Club Show in the same issue). Thank you to both clubs, but that is not why I am writing this.

Shell collecting is not a growing hobby. This should come as no surprise to any COA member, but I thought it should be said as it is human nature to assume present conditions are stable and will remain in effect. There are a number of reasons for the downturn in the participation in and enjoyment of conchology. At every COA convention I hear about declining shell club membership ("Our shell club has only lost members the last few years."), the lack of young members ("Kids are into electronic pastimes rather than the natural world around them."), and increasing pressures against shell collecting ("*COA Supplement 1* shows a scary and limited future for shell collecting."). Yes, there are serious problems in the shell collecting world, so I thought it prudent and timely to share a success story to bolster us all up. Broward Shell Club is certainly a bright light in the present environment.

As I was working on the March issue, COA member and shell dealer Sue Hobbs (whose display tables are a shell show in and of themselves) wrote to Nancy Galdo to thank her for a well run, well attended shell show and asking that they might share with the rest of COA just what they are doing right at Broward. Nancy wrote back and laid out what Broward has done the last decade or so to maybe turn things around. Make no mistake. This is an important story. Broward increased membership from 75 to 310 in 8 years. This is better than a four-fold increase at a time when many club have memberships are headed the other direction. Not all clubs can emulate Broward: different areas, different club dynamics, etc., but here is how one club is succeeding and there may be a lesson or two or at least a couple of hints at how you can spark up your shell club. In any case it is a good story and deserves to be told. Here is the Broward success story as told by Nancy Galdo.

Tom Eichhorst

This is the scientific room for the shell show, with displays in the central portion and dealer tables around the edges. It is a spacious well lit area that easily handles our many visitors.

Thank you, Sue Hobbs, for your kind words recently about our Broward Shell Show. You requested we share publicity/success ideas and we will gladly do so. First of all, many thanks to Joyce Matthys for her very thorough response outlining methods the Sanibel Club has utilized to achieve their high level of success year after year. Their inspirational Artistic Division has long set the standard among all shell clubs. Their advertising is amazing as well, and they have the full backing of the entire community. And yes, the location makes a huge difference in the success of the Sanibel show. Joyce runs a magnificent show, in so many ways!

It's hard to follow that, but I appreciate the opportunity to tell the Broward Shell Club story. While the Broward club has been around successfully for decades, we have experienced enormous growth during the past seven years. We have grown from 75 members in 2009, to 310 members in 2017. It's difficult to separate our show's success from the overall success of the club but here is what we have done.

1) PUBLICITY: We started paying for show advertising and focused on drawing locals to the show to increase our membership. We currently advertise in two major newspapers, the *Sun Sentinel* and the *Palm Beach Post*, and list in additional newspaper, magazine, and on-line travel calendars. Fortunately, our club membership includes two excellent graphic artists who have been essential in branding our club's identity by creating colorful flyers, posters, and newsletters. We also run an active website and Facebook page.

One very important shell show publicity partner has been the local *Pompano Beach Pelican*, a Friday newspaper publication. I spoke with the *Pelican* owner who agreed to support our club. Each year, we advertise on two Fridays before the show. Alternately, the *Pelican* runs two feature articles for us on the Fridays between the ads, giving us an entire month of local exposure. Our *Pompano Pelican* ad includes a unique clip-off DISCOUNT MEMBERSHIP COUPON, "Bring this coupon with you to the show and receive a 50% discount on annual club membership." So at the half price membership fee of $9, the first year we signed up 25 new members. Each year, the show coupon has brought increased membership enrollment. During our recent 2017 show we signed up an amazing 45 members! This has been our most effective way of increasing membership. The new members have brought vitality and excitement to our club. Many are currently on our board of directors!

Each year, I submit two articles, with photos, to all South Florida newspapers. One of our first feature articles was about how Broward Shell Club member Sonny Ogden collected her giant clam in Kwajalein and brought it back to Miami. Sonny brings her clam to each show and it is a favorite photo op for our guests. Sonny was our club president for many years.

Broward Shell Show ad and flyer, art work by Richard Kent. Not every club has this kind of talent to draw upon, but you might be surprised what some of your members can do wih a computer.

Broward Shell Club member Sonny Ogden with her giant clam from Kwajalein. Sonny provides this popular and educational display at every shell show.

The importance of volumteers to club success cannot be over-stressed. Here (left to right) Linda Laurin, Linda Zylman, Rex Stilwill, and Cindy Murfey cheerfully man the club sales tables.

An important service for shell collectors, the shell identification table. Here Dr. Harry Lee examines a miniature shell specimen while Carole Marshall and Tom Ball look on. Tom is the incoming president of the Broward Shell Club.

2) ARTISTIC DIVISION EXPANDED: In 2009, we opened a second room at the shell show for artistic exhibits. During the following years, as artistic participation increased, our club membership increased. An important consequence of this action is we now have a strong Broward artistic/shell craft club that meets monthly. We have more artistic exhibits and the overall quality of the show's artistic entries is much higher. Additionally, the artistic club sells their beautiful creations at the shell show.

3) ADDITIONAL SOURCES OF REVENUE: Admission to the Broward Shell Show is FREE and because of this we needed to create new ways to fund the show. We now receive over $400 in membership revenue at each show. Because of our added publicity and advertising, we have received many shell and shell craft collection donations from strangers who found us on the web. This allowed us to sell higher quality seashells and shell craft items at our club sales tables at the show.

FOUR EXCITING CLUB FEATURES: These keep the club healthy and members coming back for more.

1) CLUB MEETINGS. We present an interesting, high-quality program related to shells, shell craft, or related subjects at each club meeting.

2) MINI-MARKET. We hold a mini-market one-half hour before each meeting begins for members to sell their shells and shell-related items.

3) END-OF-MEETING RAFFLE. Our raffle table creates a great deal of excitement as a meeting finale.

4) FIELD TRIPS. We plan regular field trips and activities throughout the year: a spring Bar-B Q, a visit to the Sanibel Shell Show, shelling trips, Lunch and a Movie, museum visits, etc. Our annual auction, a major funding source, is held every March and features many beautiful shells and shell related items. All are cordially invited to attend and we take outside bids if you cannot make it. An auction list can be downloaded on our website: www.browardshellclub.org or on our Broward Shell Club Facebook page: https://www.facebook.com/groups/BrowardShellClub/

We have had a great deal of fun along the way and really enjoy working together. The Broward Shell Club even hosted the 2015 COA Convention! A special thanks goes to Alice Pace, Shell Show Chair, and her trusty companion, Bob Pace, who have continued to produce excellent shows year after year, and to Sonny Ogden whose work as club president has been a major reason we have had this success. Please email me directly and I will be happy to share examples of our publicity with you.

Nancy Galdo
publicity chairperson, Broward Shell Club
nancygaldo@gmail.com

A Panama City Trip: Panama City, Panama, That Is

Linda Brunner

(first published in *Shell and Tell*, the Gulf Coast Shell Club newsletter, March-April 2017)

Let's face it....winter, even in Florida, can get to you! Christmas and New Year celebrations are over and you are waiting for warmer temperatures and new adventures. Jim and I decided to start our adventures early. We opted for a February trip to Panama with Peggy Williams. We gathered our passports, shelling gear, and we were off on February 8th for Tampa, Houston, and, finally, The Republic of Panama.

The first leg of the trip was not without incident, when we collided with a traffic cone on I-75 while passing through a construction site around midnight. We stopped and checked and all seemed okay until we left the interstate in Tampa. Apparently the wheel well had been rearranged and was rubbing against the tire, but we had a plane to catch! We parked the car at the airport parking venue, told the owners what had happened, and said we would be back in a week. On to the plane!

We boarded the plane at 6:17 am and were soon in the air. Changing planes in Houston, and landing in Panama City, Panama, at 2:11 MST. Three time zones and no sleep for over 24 hours. We were tired but ready to collect shells! It was only mid afternoon.

We were met by the owner of our Panama residence, Silvard Kool, who drove us (with a short shopping trip to a grocery and a stop at McDonalds) to our lodging, Casa Caracol on Playa Corona.

There were two tides the first day and we took advantage of both. We also did some night shelling and found the species different than during the day. In the morning we found *Conus princeps*, *Cypraea cervinetta*, *Naticarius chemnitzii*, *Chama* sp., *Vasula melones*, *Acanthina brevidenta*, *Gemophos sanguinolenta*, *Leucozonia cerata* (huge, dead) and *Nerita funiculata*. For you bivalve people we also found two arcid species and freshly dead *Protothaca grata*. In the evening we found some repetitions, but also *Conus purpurascens* and two new cowrie species, *C. arabicula* and *C. robertsi*.

The next day we were up very early (I learned how to set my phone alarm, thanks Peggy) and off to Hicaco. The drive was long, about 255 kilometers from our base, and we missed the super low tide. We did get to do some shelling as the tide was coming in. We found *Conus patricius, Conus purpurascens*, and 2 small unidentified cones. There were Naticidae and large *Acanthina brevidentata* on the rocks. No night shelling as we were too tired after the long trip.

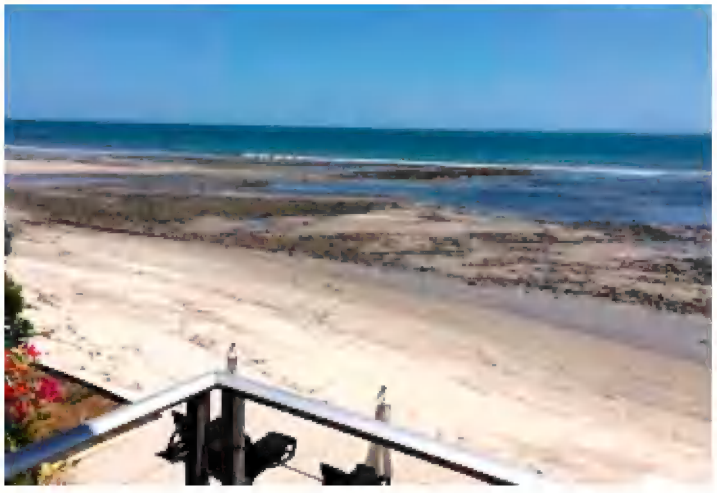
The alarm sounded early the next morning for our trip to Punta Este. We shelled two locations, each different with different specimens. The first was a broad beach with dunes and turtle nests that were protected by stakes. On the way from the car to the beach I managed to catch my foot in a very strong vine, which afforded me a close view of the

The road appraoching Casa Caracol on Playa Corona.

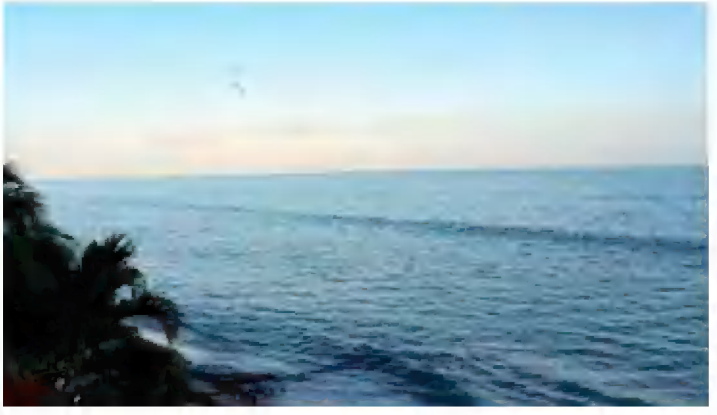
The front entry to Casa Caracol on Playa Corona, with the welcome sign out even though it was siesta time.

Through the entrance and down the steps to Casa Caracol on Playa Corona.

Out the back door (our room is the middle on the ground floor) and down the steps to the beach.



The receeding tide to the left of our back patio. What looks like gravel are actually fairly large rocks.



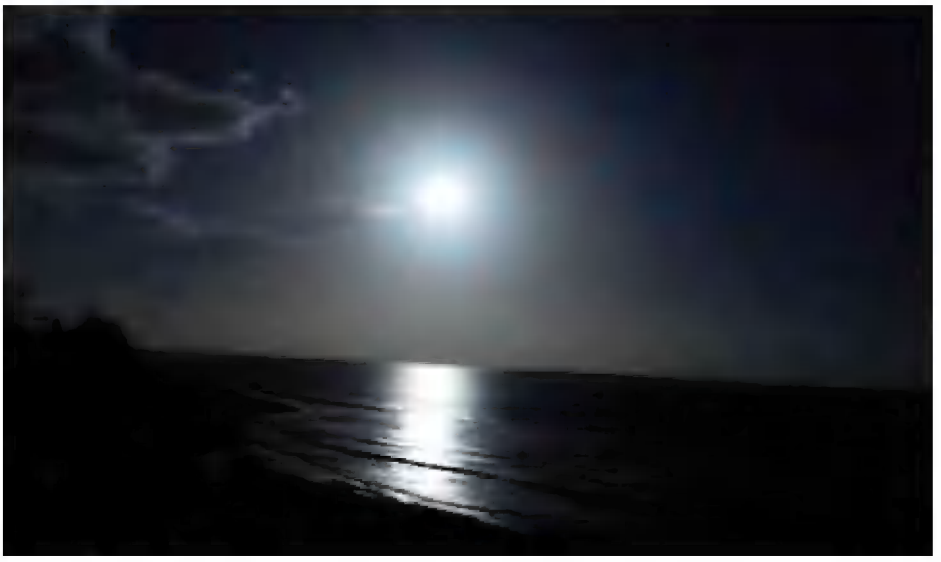
A scenic view when the tide was in and wonderful for collecting when it was out.

The receeding tide to the right of our back patio. Lots of rocks begging to be turned.

Shells graciously provided by our host, Jim Ernst, collected on Ensenada Beach.

sand. Jim's laughter would come back to haunt him about an hour and a half later. The young life guards/beach patrol were very interested in what we were finding. When I showed them the *Olivella*s I had located they were mystified. I think their puzzlement was as to why I would come to their country to collect these tiny shells. Along with the *Olivella semistriata*, we also found *Donax panamensis*, a *Ficus ventricosa*, and a *Tonna ringens*. The fig and tun were dead collected, but in nice shape.

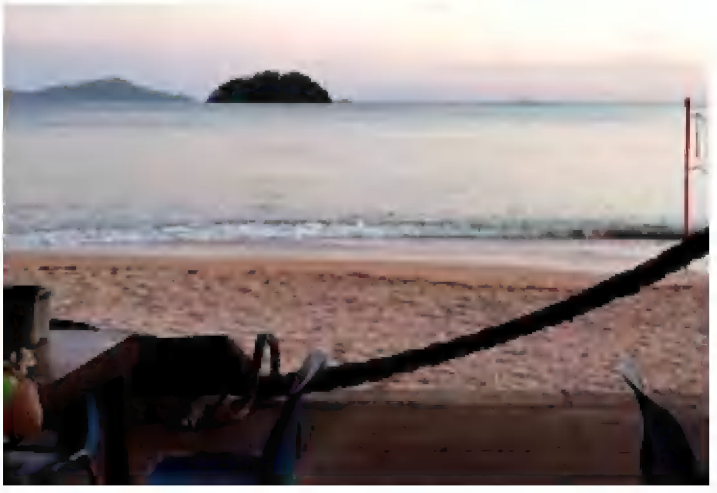
On to nearby site two, Bahia de Chame. While this site also had a sandy bottom, the shore was lined with large rocks where we found *Thais kiosquiformis*, *Cerithium stercusmuscarum*, *Rhinocoryne humboldti*, *Vitta luteofasciata*, *Larkinia grandis*, *Martesia striata* (in wood, on a rotting boat), *Mactra vanattae*, more *Donax*, periwinkles, *Protothaca gratis*, and *Nassarius* spp.



A good night's sleep and we were up at 7:30 and out shelling on the rocks by 8:45. We had to wait a few minutes for the tide to go out. Not many images can compare to the moon over an ocean.

It was about this time that Jim made an error in judgment. As he was leaving the rocky area to check out an exposed sand bar, he stepped in sand and went up to his knee. Thinking his next step looked firm, he tried it and now had both legs in deep, wet sand. My advice to lie down was finally taken and he crawled out. Needless to say he found a different route back to the car. All he lost were his dive gloves and collecting container. He labeled the afternoon the "Muck March".

Arriving back at Casa Caracol, our host presented us with some of his finds of the day from Ensenada Beach. This was a new site for him and he was gracious to share. He presented us with a large *Cypraea cervinetta*, *Bursa corrugata, Cypraea robertsi*, *Cypraea arabicula*, *Turbo fluctuosus*, *Neorapana muricata*, *Vitularia salebrosa* and an unidentified cone. We never found a *Neorapana* nor a *Vitularia* on our own. Jim noted that the point of this gift proved that people in their fifties can turn over much larger rocks than people in their seventies.



(Above): Venado Beach with the tide in, (below): Venado Beach with the tide out.

We left at 8AM the next morning for Venado Beach, made famous by all the data slips from Al Johnson. This beach is west of Panama City and about 80 kilometers away. There is a small domelike island about 1/4 mile offshore that is accessible by a rock sand causeway at low tide. The advice we received was to walk all the way out and shell on the way back.

Here we found *Bursa corrugata*, *Cypraea robertsi, Parametria* species, *Protothaca gratis*, *Cypraea arabicula*, *Linatella wiegmann*i, live worm shells, and dove shells. The tide started coming in and we were not sure how fast it would move, so we headed back. An exuberant golden retriever bypassed Jim in favor of greeting me with a jump. We had an appointment in Panama City, after this and I was trying to stay neat, forget that! Had I known that I would have this encounter I would have brought a change of clothes.

Looking for treasure under rocks.

The toucan who got the fresh fruit instead of us.

Our Panama shellers, left to right: Peggy Williams (we will all miss her dry humor and wit), Jim Ernst, Linda Brunner, and Jim Brunner.

We had lunch at a very nice restaurant nearby. When we were entering the restaurant there was a waiter exiting with a beautiful array of fruit cut into bite size pieces. Yum! We asked our waitress about getting the same and were told that it was for the animals. Actually it was for their toucan. After lunch it was time to continue on to Panama City. I rushed to take a picture of Venado, with the tide in, while Peggy talked with our host, Jim Ernst. The pathways were underwater and we were off to do some box shelling.

We snapped a few pictures of Panama City, which is a sprawling modern city. I was fascinated by some of the unusual (to me) palms. When we arrived at our destination we were greeted by Jim's canine buddy who was very glad to see him and was accepting of us. We grabbed a pizza on the way home and slept well, after a very long and tiring day.

The next day was our last chance to shell. We spent it in front of our lodging. While the rocks may look like gravel in the previous pictures, I can assure that they are not gravel. My loving husband managed to get some shots of me doing what I love.

I could go on and on, show more pictures and tell about more adventures, but, all good things must end, and this was a good thing. We found over a hundred species of marine shells, some we have been unable to identify, and some we had not previously collected. We worked diligently every day and came home tired and happy. So on February 15th we were up at 3am to leave for the airport. We said goodbye to the moon and Casa Caracol, vowing to return next year? Interested?

The car saga continued when we landed in Tampa. We had made a tool to use in turning rocks. It came in handy to use to pry the wheel well away from the tire. We changed our hotel reservation to a hotel that was closer to the airport, got their last room, had dinner, and went to the car dealership the next morning. The dealer took the wheel well apart, gave me a plastic bag with the parts, and assured us we could drive home safely. My local dealer has ordered new parts to repair the damage, so, instead of a new tire for hundreds, we get a new wheel well for less than one hundred. Beware of cones, traffic and marine.

Sadly, soon after this trip, Peggy Williams passed away. She was returning from a shelling trip of course. Peggy was a solid fixture in COA for many years, a friend to many. We will miss her.

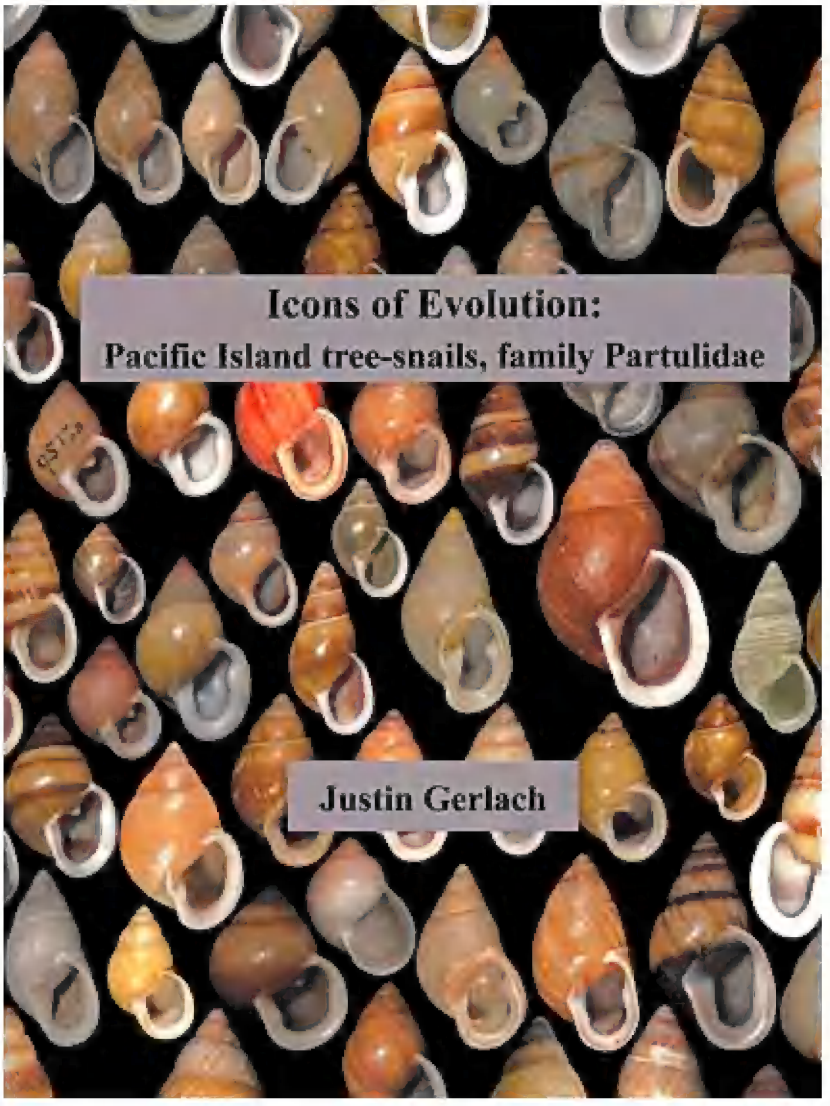
Linda Brunner
jili1043@comcast.net

A few Panama shells: 1. *Cerithium stercusmuscarum* Valenciennes, 1833, 2. *Rhinocoryne humboldtii* (Valenciennes, 1832), 3. *Cypraea cervinetta* Kiener, 1843, 4. *Cypraea robertsi* Hidalgo, 1906, 5. *Cypraea arabicula* Lamarck, 1810, 6. *Ficus ventricosa* (G. B. Sowerby I, 1825), 7. *Monoplex wiegmanni* (Anton, 1838), 8. *Bursa corrugata* (Perry, 1811) form *caelata* (Broderip, 1833), 9. *Cymia tectum* (W. Wood, 1828), 10. *Vitularia salebrosa* (King, 1832), 11. *Neorapana muricata* (Broderip, 1832), 12. *Vasula melones* (Duclos, 1832), 13. *Thaisella kiosquiformis* (Duclos, 1832), 14. *Anachis fluctuata* (G. B. Sowerby I, 1832), 15. *Opeatostoma pseudodon* (Burrow, 1815), 16. *Olivella semistriata* (Gray, 1839), 17. *Triumphis distorta* (W. Wood, 1828), 18. *Conus* (*Chelyconus*) *purpurascens* (G. B. Sowerby I, 1833), 19. *Conus perplexus* (G.B. Sowerby II 1857), 20. *Chama buddiana* C. B. Adams, 1852, 21. *Larkinia grandis* (Broderip & G. B. Sowerby I, 1829).

Icons of Evolution: Pacific Island tree-snails, family Partulidae

by Justin Gerlach

ISBN (soft-cover) 978-0-99322-034-0; published in 2016 by Phelsuma Press, Cambridge, UK, 8.5 x 11 in, 334 pages, lavishly illustrated with full color plates, line drawings, charts, and maps. Cost approx. $99, available from MDM Shell Books (mdmshellbooks.com) and Conchbooks (conchbooks.de).



If you read, "There was a minor event last year" on page 4 of this issue, you may have noticed that I quoted and referenced *Icons of Evolution* by Justin Gerlach quite a bit. The reason is that his marvelous book on the tree-snail family Partulidae is a thoroughly researched in-depth coverage presented in a clear and concise manner. An important, perhaps seminal, work that captures vital aspects of this tree-snail family and much more. The importance of this work does not lie in its use as an identification tool (although it is certainly the very best reference available), but rather in the detailed account of the discovery of Partulidae, the taxonomic history of this family and its importance in our understanding of evolution, the key participants in the Partulidae story, and perhaps most amazingly, the completion and closure of scientific work begun 100 years ago. My article on page 4 stresses that this family has suffered more than decimation (which after all originally meant destroying 10% of a subject population, rather than the 50% loss of Partulidae), but while Justin Gerlach certainly covers these facts, his work melds a tale of discovery and research with the complex natural history of these snails.

Over 200 years ago (1728-1779), Partulidae were "discovered" and samples brought back to Europe on the *HMS Endevour*, captained by James Cook. The first species in the family was named (1784), then renamed (1791 - read the article), and then over 100 years ago (1906) Henry Crampton began a ground breaking study of Partulidae that began with population descriptions and ended with his attempt to demonstrate Darwinian evolution -- specifically speciation. While largely accepted today, his use of statistics and indeed his subject matter were ground breaking at the time. Crampton completed his work on the Tahitian population in 1916, then the Moorean population in 1932, but he died in 1956 with his work on the remaining islands inhabited by Partulidae incomplete and unpublished. This volume completes Crampton's work as well as covering the work accomplished by other researchers through the years. It is a fascinating read and is important scientifically, especially as we face the loss of this tree-snail family.

This book can be viewed as a textbook on Partulidae, a compendium of the living and extinct species, and a documented history of the actions and activities centered around and involved with this family of tree-snails. For the scientific-minded or those who enjoy digging into taxonomy, Justin Gerlach provides plenty of material. For those interested in tree-snails, but not looking for the science involved, there is still plenty of material. It is well presented, easy to read and understand. This is an important book, a solid reference; well worth the price.

Reviewed by Tom Eichhorst

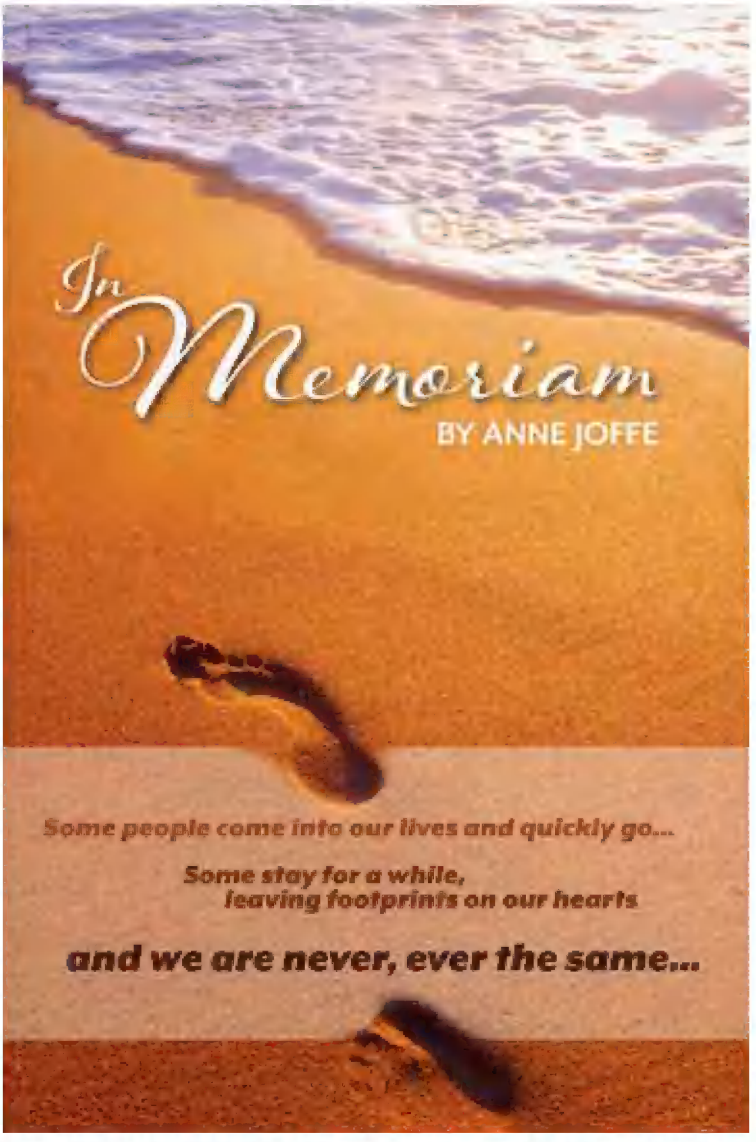
In Memoriam

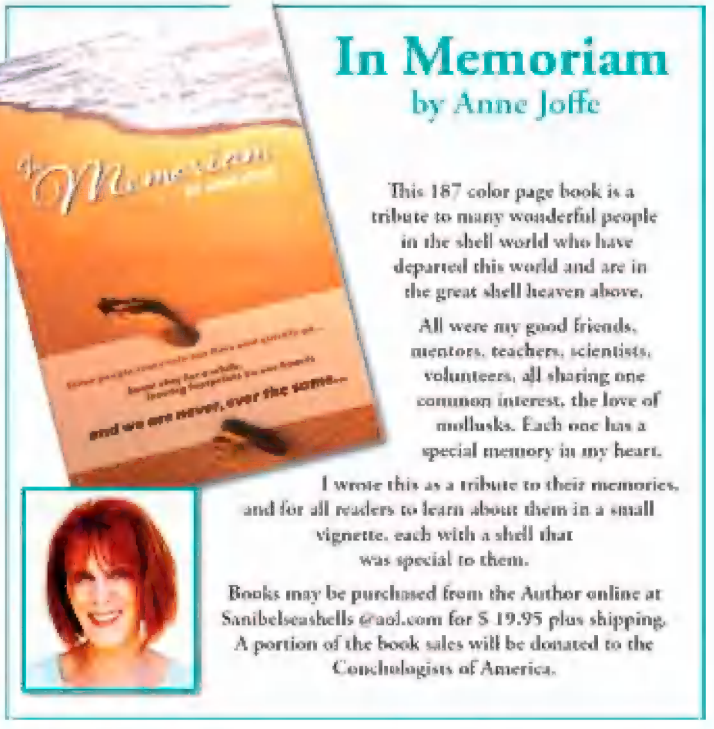
by Anne Joffe

Self-published, 2017, 189 pages, numerous color illustrations throughout, $19.95 plus shipping from the author at: sanibelshells@aol.com A portion of the proceeds will be donated to COA.

Our resident COA redhead has dropped a nice little gem into our midst. On the inside front cover Anne writes, "This book is a work of love, for I have loved being a part of the shell world for the past 40ish years. It has been my joy and privilege to have known all these wonderful people who have come into "my shelling life," and left the memories with me." What follows are written "snapshots" of 186 people who have passed away who were involved in the shell world and who Anne called friends. There is a picture of almost every person, a shell Anne associates with that person, and a short paragraph or two – in more or less a word association aspect. You will find shellers, both amateur and professional as well as famous and little-known, all of whom touched Anne's life and "shared a love for mollusks." These are people dear to Anne's heart; people she remembers, and memories she wants to share with her sheller friends. I found entries that were interesting, and others that caused a chuckle as Anne's words brought up my own memories. If you are into shells, you will know some of these folks and hopefully get your memory bumped a bit by Anne's recollections. This book is not all inclusive, it is more like an evening sitting with Anne at a COA convention and reminiscing. Each of us would have a slightly different list of the people we remembered. This is Anne's list and I, for one, am grateful she took the effort to publish this trove of memories. Anne's cutoff date for the book was 31 December 2016, so there are already a few folks who have only recently passed away that would have been included. Still, this is a wonderful tribute and like having a wall with old family photographs, it is of value for its own sake and for what it means to both Anne and her readers. Thank you Anne, I am proud to add this to my shell book library.

Reviewed by Tom Eichhorst





2017 Astronaut Trail Shell Show

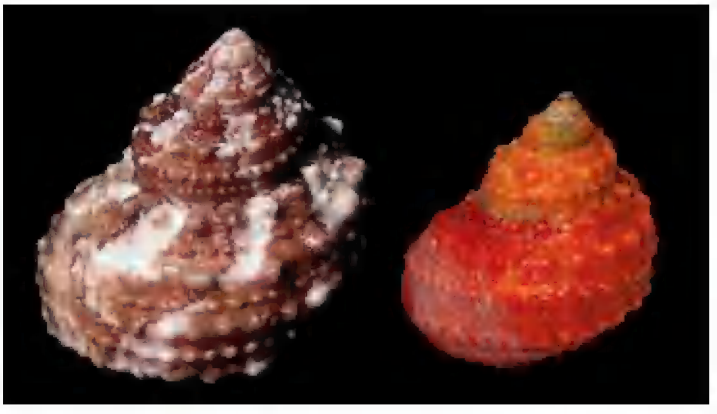
21-22 January 2017 at the Eau Gallie Civic Center, Melbourne, FL

Carolyn and Earl Petrikin with their blue ribbon and COA Award for a display titled: "Colors of Worldwide Molluscs."

The Petrikin display, "Colors of Worldwide Molluscs" was truly a hit at the 2017 Astronaut Trail Shell Club Shell Show. Shells attract a crowd and colorful shells really attract a crowd – that is what Carolyn and Earl provided. About shell color, Carolyn says (adapted with slight editing from the display write up):

Shells with beautiful colors have always been somewhat of a mystery to both shell collectors and beach walkers alike. "What did you do to get that color in your shells? Have they been painted?" Questions commonly asked at shell shows everywhere. Then there are mollusks with a natural, almost pure white shell or the unusual albino specimen. Bright colors or white, shells are often beautiful and always intriguing. Color is found in mollusks living in the depths of the oceans, while others display their vivid colors in shallow water, indicating that environment is not the only determining factor in molluscan color. Tropical sea waters are home to a majority of the colorful shells found in the world, while frigid water mollusks are most often white or have only pale shades of color.

Colors can come from organic pigments found in the mollusk's food, which are then are distributed through its blood system. These pigments are found in both the hard calcium shell and the animal's soft body parts. In the shell, the colors are laid down by the fleshy mantle as it grows new shell by secreting calcite and aragonite with imbedded pigments. Four pigments: yellow to orange carotenoids, green porphyrins, brown to black melanins, blue and red indigoids, and combinations of these are the source of the many beautiful colors admired in mollusks. The living animal inside the shell is sometimes more colorful than the shell! Red to violet specimens are frequently seen, while bright green and vivid blue shells are more rarely found.

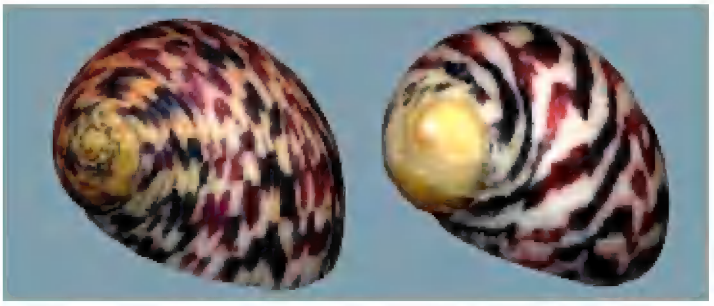


Color variation in *Turbo castanea*, a common Atlantic coast shell.

Colors vary in shells even within the same species and the same habitat. *Chama macerophylla* Gmelin, 1791, the jewel box, is a common Atlantic coast bivalve that lives attached to rocks or seawalls. It is often found with yellow,

***Lyncina aurantium*, the golden cowrie, has long been appreciated, even coveted, for its orange color. Once rare, it is now fairly common and still very popular with collectors. There is only minor color variation within this species. Photo from Wikipedia.com.**

***Nemocardium bechei* (Reeve, 1847) is a favorite because of its bright color, with little variation. Photograph by the Petrikins.**



***Nerita peloronta*, the bleeding-tooth nerite, has an extremely variable color pattern: solid white, almost solid black, red and black wavy bands, red only bands, black only bands, and combinations of these patterns.**

lavender, and white specimens living within inches of each other. *Turbo castanea* Gmelin, 1791, the chestnut turban, is a common Caribbean shell that varies from its typical light brown mottled shell to a bright orange shell. Some molluscan species have colors that remain consistent regardless of habitat; thus *Lyncina aurantium* (Gmelin, 1791), the golden cowrie, varies in color only slightly within the species. Diet, genetics, and environment or habitat all seem to play differing roles in the color differences in mollusks around the world.

If the pigment is secreted continuously from one area, a spiral or radial band is created. Patterns or spots or flecks are present when secretions are made periodically. The alphabet cone, *Conus spurius* (Gmelin, 1791) and the Florida volute, the Junonia, *Scaphella junonia* (Lamarck, 1804) are among the numerous shells with dotted surface patterns. Mollusks with lines include the banded tulip, *Cinctura hunteria* (Perry, 1811), with fairly straight lines after pigment has been continuously deposited in one point from the mantle and the bleeding tooth nerite. *Nerita peloronta* Linnaeus, 1758, has wavy lines caused by a continuous but moving point of pigmentation.

Much of the science of molluscan shell pigmentation is known, but there are still unresolved issues and questions. In the meantime, people at shell shows and on the beach will appreciate and wonder at the beautiful colors found on seashells – like they have for thousands of years.

***Scaphella junonia*, known as "the junonia" is pigmented with regular squarish spots that differ only slightly between specimens. Photo on Wikipedia.com of a display at the Bailey-Matthews Shell Museum, Sanibel, FL.**

70th Annual St. Petersburg Shell Show

Feb 2017, St. Petersburg, FL.

Doug Thompson from Lynn Haven, Florida, with his COA Award for a display titled, "Self-Collected Florida Lion's Paws." Doug also won a shell of the show award with two *Spondylus americanus*, one trapped within the other.

The 70th annual St. Pete Shell Show was a huge success. There were lots of quality displays and plenty of people to enjoy them. Doug Thompson was awarded the COA award for his display, "Self-Collected Florida Lion's Paws." His display took up 25 feet with 25 cases of various sizes showcasing color and structural variation of the shells as well as details of shell morphology. Shell Show Chairman was John Jacobs. The Scientific Judges were Dave Green & Alan Gettleman; the Artistic Judges were Lynn Gaulin & Mary Ellen Akers. There were over 300 feet of displays. Other awards presented include:

-The DuPont Award to Vicki Wall for "You're Going Where?"

-The Florida Museum of Natural History Award to Ron & Mary Jo Bopp for "Shells of the Caloosahatchee Formation in Florida."

- The Smithsonian National Museum of Natural History Award to Martin Tremor Jr. & Conrad Forler for "For The Love of those Cockles."

Shell of the Show (self-collected) was *Spondylus americanus* Hermann, 1781, by Doug Thompson.

Shell of the Show (any means) was *Homalocantha anatomica* (Perry, 1811) by Wayne & Patty Humbird.

Doug's self-collected shell of show, a double *Spondylus americanus.*

Some of Doug's lion's paws.

80th Annual Sanibel Shell Show

Sanibel-Captiva Shell Club

2-4 March 2017

Pat & Bob Linn with their COA Award for a display titled, "The Bonnets of the World." Their exhibit was in 6 cases spanning over 18 feet.

The 80th annual Sanibel Shell Show began with a ribbon cutting to mark the festivities. COA member Joyce Matthys (Shell Show Co-Chair) and Mayor Kevin Ruane cut the ribbon, aided by COA members Donald Dan and Irene Longley (Shell Show Co-Chairs), Vice Mayor Mick Denham, and Councilman Jim Jennings. With the club's shell show and other activities they were able to add over 35 new members during this same period. Congratulations.

Shell Show Chairs were Bruce Schulz and Tom Annesley. The Judges for the 80th Annual Sanibel Shell Show were Dr. José Leal and Robert Janowsky for the Scientific Division and Sharlene Totten for the Artistic Division. The show had a total of 408 feet of display and over 3,000 paid attendees.

Pat & Bob Linn won the COA Award for their cassid display titled "The Bonnets of the World." Other winners include:

- The DuPont Trophy & People's Choice Award to Joyce Matthys for "Rediscovering Sea-silk."

- Anne Joffe Sanibel Superstar Award to Doug Thompson for "Self-collected Northwest Florida Deepwater Specimens."

- Shell of Show (self-collected) was *Sinistrofulgur perversum* (Linnaeus, 1758) by Doug Thompson.

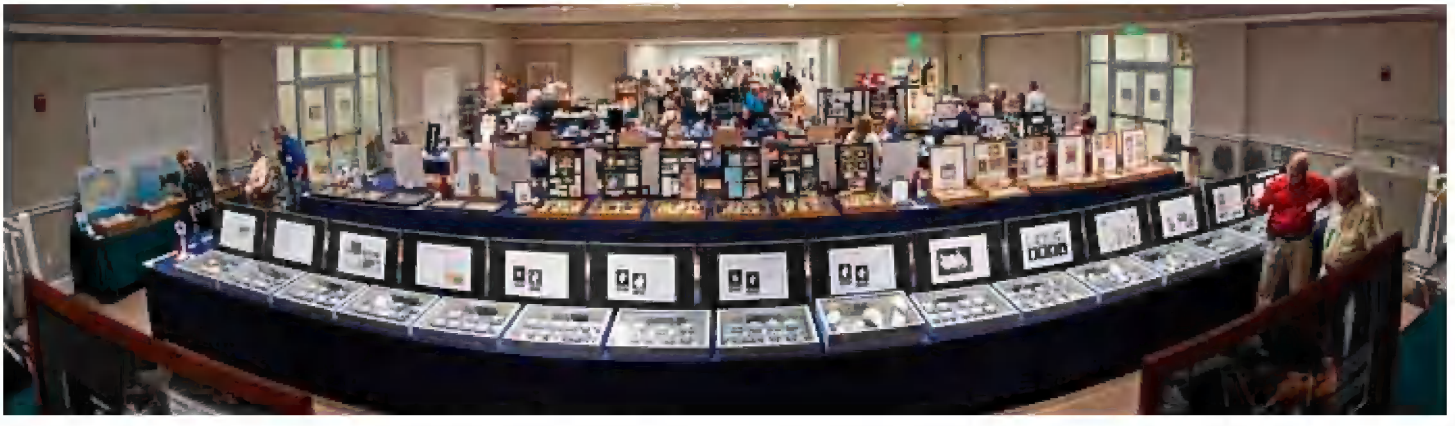
- Shell of Show (any means) was *Livonia mammilla* (G. B. Sowerby I, 1844) by Greg Curry.

- Shell of Show (fossil) was *Vermicularia recta* Olsson & Harbinson, 1953 by Irene Longley.

- Best Sanibel-Captiva Shell (self collected) was *Oliva fulgurator* (Röding, 1798) by Mary Giambruno.

- Best Florida-Caribbean Shell was *Spondylus americanus* Hermann, 1781, by Doug Thompson.

Sanibel continues to be a thriving club with a scientific grant program second only to COA.



Scientific Judges Bob Janowsky & Ron Bopp discuss Ron's incredible fossil display. Photo by José Leal.

In Memoriam (cont'd from p. 15)

Dotty DeVasure

Long-time club member and supporter Dotty DeVasure passed away in February 2017, at the age of 83. Dotty & Lowell DeVasure retired to Sanibel in 1976. They were enthusiastic shellers, traveling around the world collecting seashells. They also entered the Scientific Division of our Shell Show every year. From 1976 until Lowell passed away in 2010, they won countless blue ribbons and special judge's ribbons, the Sanibel Community Association Trophy, the San-Cap Shell Club Trophy, the Masters Trophy, the City of Sanibel Trophy twice, and the prestigious Conchologists of America Award three times.

In 1995, when the Bailey-Matthews Shell Museum opened, Dotty became a volunteer docent in the Great Hall of Shells. Beginning in 2011 Dotty also volunteered as the museum's official beach guide, leading tours of Algiers Beach once or twice a week. At their 20th silver anniversary celebration, the museum honored Dotty as one of five volunteers who had worked tirelessly for them since they opened.

For our club, Dotty volunteered each year for all three days of the Shell Show in the Scientific Room ensuring the safety of the exhibits. More recently, she frequently sold our craft shells there as well. For many of us, Dotty will best be remembered for her ever-present smile and her sunny disposition. She epitomized the saying "great things come in small packages."

Bet Hamilton

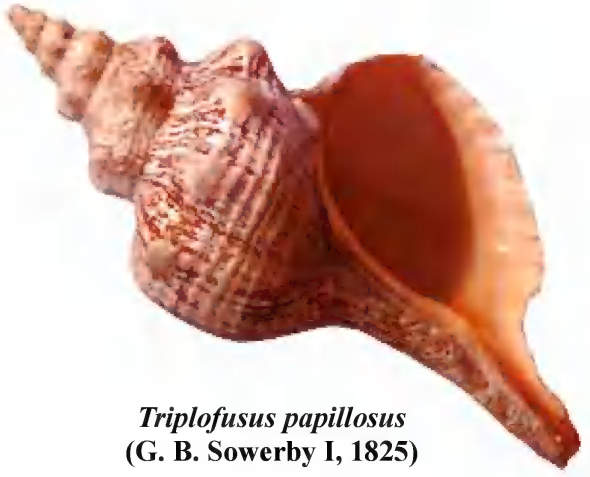
Bet Hamilton's many shelling friends were saddened to learn of her death in September 2016. After moving to Venice, Florida, from her home state of Massachusetts, where she had been a pastry cook and horsewoman, as well as raising two children, she became involved in all aspects of shelling. She took trips all over the world: to shelling spots in Florida, the Bahamas, Venezuela, Panama, San Blas, the Dominican Republic, and the Philippines.

One of her specialties was the Florida horse conch, *Triplofusus papillosus*. Her special exhibit of these was displayed publicly in the Venice area. She won numerous awards as an exhibitor at Florida shell shows and was an active member of the Sarasota and Englewood Shell Clubs.

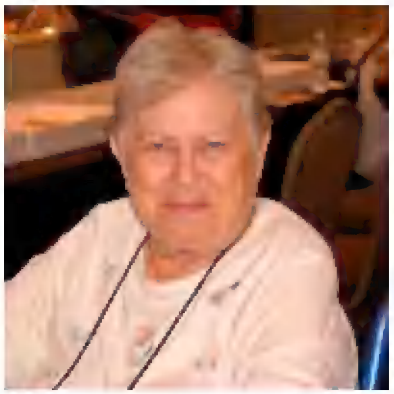
As a certified scuba diver, Bet was able to plumb the depths of many of the spots to which she travelled. She continued diving well into her 80s. She frequently dove off the Venice coast and came back with both sharks' teeth and shells.

Bet was known for her dry wit, her courage, her generosity, and her sense of humor. She broke her arm on one of her trips, but that didn't stop her from finishing out her day of shelling. She and her good friend June Bailey entertained COA conference attendees by dressing in an engaging mermaid costume. Admire one of Bet's shells, or if she found something and you didn't, and it would end up being yours. A memorial sea burial was held June 12, 2017, off the Sarasota coast.

Bailey-Matthews Shell Museum, Sanibel, Florida



Triplofusus papillosus
(G. B. Sowerby I, 1825)



Betty Lipe

Betty Lipe passed away on February 26, 2017; she was 80 years old. Betty and her husband Bob were St Pete Shell Club members for over 50 years. She served the club in various capacities throughout the years, including president, treasurer, editor, recording secretary, and shell show chair. She was past president of the Conchologists of America, as well as, a *Neptunea* recipient in 2006. In 2001 when she learned that the Advertising Director for American Conchologist quit, she asked who the new director was in order to pay for the ad for the Shell Store (Betty and Bob's shell shop in St. Pete). When told no one had stepped up for the job, she immediately volunteered, even though quite busy with other activities. Her home was always open to visitors from the shell world, especially at shell show time. We will miss her tremendously and will never forget her...

From Marcus & Jose Coltro:

Back in 1980s Jose and I risked everything on an uncertain way of life. Most of the people we knew thought we were crazy, but in spite of this we started a shell business in Brazil with a handful of collectors. In February 1988, my first trip to the USA, we went to participate in a shell show in St. Petersburg, Florida. We thought we had reservations for a space to display our collection at the show, but back then communication was not like it is today, neither was our English... When we arrived in St. Pete we found out that we did not have a confirmed table, so no space was reserved for our new business. Betty and Bob noticed that those two "kids" (I was 24 and Jose 28) looked devastated and after hearing of our problem they managed to squeeze in a extra table so we could display our shells. We even won a prize for our display!

This was just the start of more than a long friendship. On the same trip they also invited us to stay at their home. We barely spoke any English, but they managed to communicate and took us in as if we were their own kids. After that we spent a lot of precious time with them during many shell shows and trips. Betty and Bob Lipe are very important in our lives, so much so that we have always considered them our American parents.

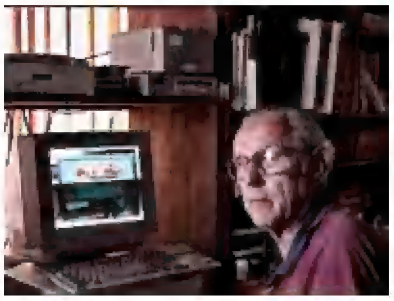
So, Betty, we would like to thank you very much for being our American mom and say we love you!

Edith Marie Singleton

Edith Marie Singleton, 94, of Bradenton, Florida passed away peacefully May 24, 2016, with family at her side. She was born May 29, 1921, in Newport, Rhode Island. She moved from Rhode Island to Miami, in time for the 1926 hurricane – the roof was blown off her family's apartment. She graduated from Miami High School in 1938 and worked as a secretary in a Miami Beach law office. She met Jack Singleton, a Miami street car operator, on her way to church. She was a loving and dedicated wife, mother, and grandmother and was actively involved in her community's church. The family traveled the USA extensively, visiting nearly all 50 states. They relocated to Sarasota in 1965, where Edith and Jack established Singleton Realty, which they operated until their retirement in 1978. After retiring Edith and Jack made numerous trips to Europe, the Holy Land, Australia (her favorite), Hawaii, and San Diego, among other places. They also lived in Titusville, Florida, for 18 years. After Jack passed away in 2003, she lived in Bradenton's Mount Vernon Community overlooking beautiful Sarasota Bay, where she enjoyed birdwatching, particularly the roseate spoonbills and white pelicans. She loved participating in the numerous activities offered by Mount Vernon in addition to attending plays and concerts. For the last six months Edith lived in Windsor Oaks of Bradenton, where she made many friends and was particularly fond of the staff. She enjoyed attending family get-togethers and keeping in contact with her friends and family via Facebook. She was an avid letter-writer, at one time having more than 100 pen pals.

During her active years she served as President and Secretary of church groups and PTAs. She was a Weight Watcher teacher. She joined the Central Florida Shell Club and enjoyed fellowship with the members while attending shell shows on the Florida East Atlantic Coast in Melbourne, and on the West Gulf Coast in Sarasota and St. Pete. She attended five COA Conventions (from 2005 – 2013) and thoroughly enjoyed the Conchologists of America.

A family tradition is to pick one's birthday cake: fortuitously she requested angel food cake for her upcoming 95th birthday…she enjoyed it in Heaven with Angels! She is survived by seven children (the oldest, Phyllis Gray), two sisters, many nieces, nephews, cousins and dear friends.
A public celebration was held Saturday, July 16, 2016, in Bradenton, FL. Family and friends shared smiles, laughter, and stories of her wonderful life. She will be missed and remembered with joy.



Wesley Thorsson

Wesley Thorsson had a lifelong interest in nature, starting with insects and birds, making frequent trips to the Natural History Museum in New York City, when in high school. He was also always interested in the sea and became a graduate of the U. S. Coast Guard Academy in 1944, and received a MS in Electronics from the U.S. Naval Academy Graduate School in Annapolis, Maryland.

As a ship's officer and as an electronic specialist in Electronic Navigation systems, he had opportunity to visit many parts of the world and first became a mollusk enthusiast in the Philippines. Returning to Hawaii after a tour in Guam, he became a dedicated diver. Time spent in the arctic balanced his tropical duty. Wesley retired from the Coast Guard as a Captain in 1968 and started an electronics operation in Dillingham's Hawaiian Tug & Barge Co. That position also allowed for trips to Guam providing opportunities for diving and shelling.

Retirement allowed more concentration on diving and mollusks. Weekly trips dredging with Dr. Thomas Burch introduced dredging into the collection of mollusks. Dredging produced a large number of microshells and their identification led to photography of shells. Beatrice Burch was a great help in identification procedures. After producing photo albums of Hawaiian shells for the Bishop Museum for Turridae, Mitridae, Costellaridae, Conidae, Terebridae and Cypraeidae, it became obvious that identification of all the dredged shells would not be possible in this lifetime. The shells were donated to the Bishop Museum and Los Angeles Natural History Museum. This was partially caused by lack of time after becoming, by default, the creator and editor of *Internet Hawaiian Shell News* when it replaced the printed *Hawaiian Shell News* as printing costs exceeded dues.

Usually Wesley made two diving trips a year to different Pacific Islands or Mexico with 45 year diving buddy Ray McKinsey or Bob Purtymun. These gave way to photo trips to a different Pacific islands each year with wife, Elizabeth Thorsson, who collected near-shore mollusks and recorded all photo data. A heart bypass in 1997 changed these dive trips to snorkeling in shallow water. On trips, about 10 to 15 species were collected each day and photographed in a photo aquarium. This was about the limit of the number of species that could be photographed in a day with details recorded of the animals.

The energy, expertise, humor, and graciousness of Wesley Thorsson added greatly to the world of malacology. He will be missed. Adapted from Internet Hawaiian Shell News.

Vexillum thorssoni **Poppe, Guillot de Suduiraut & Tagaro, 2006**

Cy Totten

Cy Totten, husband of Sharlene for 53 years, passed away December 30, 2016. Cy and Sharlene have been members of Suncoast Conchologists since 1988. And – beginner's luck – on his first field trip shelling with the club, he found a golden olive! Many of you will remember Cy as Santa Claus at the 2015 Holiday Shellabration and he also appeared as the enthroned King Neptune at one of our past Shellers' Jamborees. Suncoast Conchologists has made a donation in Cy's memory to the Lion's Eye Institute of Tampa.

Cy Totten was a man of wisdom and many words, always looking to make everyone laugh and smile. He was always eager to learn and share experiences which allowed him to be a great teacher and mentor. After graduating from high school, Cy served his country in the Navy as a Aviation Electronics Technician (Radar) Petty Officer 2nd Class and was a veteran of the Vietnam War. He received a degree in computer science and worked as a computer technician for IBM, Techforce, and going on to retire from Paradyne/ AT&T in Pinellas County.

After retiring Cy went back to work for several years driving a bus for the Pinellas County school system where he developed great empathy for the children and became a protector of many. He had a great passion for sailing and won several trophies for racing, serving as a sailing instructor for the U.S. Coast Guard Auxiliary.

He loved camping, sailing, golfing, riding his scooter around town, going on cruises and visiting family in California, New Orleans, and Michigan. He was involved in the Suncoast Conchologists Club attending shelling trips, the jamborees where he was King Neptune and played Santa at the annual Shellabration.

We will always remember his bright smile, the twinkle in his eyes, and his great spirit. He will forever sail the seas, golf endless holes, eat homemade apple pie, McDonald's hamburgers, and chicken sandwiches with a smile on his face that will light up the world. Yes, his fun-loving spirit and sense of humor will be greatly missed by all of us who knew him.

Americoliva sayana **(Ravenel, 1834) form *citrina* (golden olive)**

Helen Wheeler

Long time Houston Conchology Society (HCS) member Helen Wheeler, 94, passed away April 18, 2017. She was born and raised in Laurel, Montana, the middle child of three daughters. About a year after high school graduation, Helen married her high school sweet-heart, Homer Wheeler, on November 30, 1941. (At the age of 18, Helen was legally able to accept Homer's proposal; however at 20 years of age, Homer still legally required his parents' permission to wed.) With the war in the Pacific starting almost immediately following their marriage, Helen soon found herself a lone "war bride" living with her mother in Billings, while Homer served a tour of duty with the Navy in the Pacific. In March 1943, Helen and Homer were blessed with their first child, Glenn, with Helen having to do the parenting until Homer's return from the war. With the outbreak of the Korean War, Homer was again enlisted in service to the Navy, with the couple being stationed in Astoria, Oregon. Helen gave birth to their second son, Dan, in April 1951 while living on the coast. After their return to Billings Montana, Helen and Homer had two more sons, Steve born in December 1952 and Brian born in June 1956.

In 1952, Homer changed his career path from the railroad industry to the oil business hiring on with Carter Oil which ultimately was incorporated into Exxon today. While with Exxon, Helen and Homer moved from Billings to Tulsa, Oklahoma, to Naperville, Illinois, and ultimately to Houston, Texas, in 1967. It was in Houston, that the couple spent the remainder of their years together. Sadly, after 51 years of marriage, Homer died at the age of 71. Helen continued in Houston for thirteen more years following Homers death, ultimately moving to Tulsa, Oklahoma, for the remainder of her time.

Helen loved the outdoors and while living in Houston, she discovered shell collecting. She collected along the Texas coast and participated in HCS collecting trips to the Caribbean as well as along the coast. She was also an avid bridge player. Several years ago she moved to Tulsa, Oklahoma, to be near family, but she maintained her HCS membership. Helen had an easy laugh and a real appreciation of life. She will be missed.

Peggy & Tom Williams

Margaret (Peggy) Williams passed away on March 16, 2017. A lifelong Floridian, she collected shells for over 45 years by wading, snorkeling and diving. She won many awards at shell shows, judged too many shows to count, wrote articles for shelling magazines, travelled worldwide to collect shells, and after extensive research wrote *Shallow-Water Turridae of Florida and the Caribbean*. Peggy conducted guided shelling tours for well over 35 years, to locales around the world. She was a popular tour guide because she did her homework and knew about the area in question, but more importantly because she could rapidly change and adapt her tours to account for changing conditions and unforeseen events. After such trips she would recount the excursion with funny stories and laughter, over what could have been disastrous for many people. Peggy did not suffer fools, but she was always willing to help and guide folks new to the shell world.

Gene Everson recounts how he first met Peggy and husband Tom in the 1970s. They were reroofing their house and he volunteered to help (we were all much younger then). He arrived at the house and before climbing up on the roof he saw the bundles of wood shakes that would have to be carried up the ladder. They were heavy and cumbersome. At the time he remembers thinking, "I hope I don't have to lug one of those up this ladder." After Gene had worked a while on the roof, Peggy came up the ladder to ask if they would care for some cold orange juice. That was readily accepted, but before she went back in the house, she showed up at the top of the ladder again, this time with a bundle of shakes, asking, "Are you about ready for more of these up here?"

In later years Peggy had a more difficult time getting around, but she conducted her shelling tours right up to the end. Peggy, we will miss you.

Miraclathurella peggywilliamsae
Fallon, 2010

Conchologists of America

GIFTS-IN-KIND POLICY & PROCEDURES

Approved by the COA Board of Directors on 2 June 2017

While there is a well-established tradition of cash donations to the COA, only recently have we been fortunate in receiving substantial non-cash donations, specifically the shell collections of Walter Paine and the late Frederic Weiss, which have already had a major impact on the annual convention auctions and organization's treasury. It should become evident from the discussion below that COA must clarify how it manages such assets as these if we are going to move forward and prosper in a way that involves best practices and transparency.

COA certainly can continue to accept gifts-in-kind; in ideal cases these can ultimately be of significant benefit to the organization in fulfillment of its mission. Such gifts are extremely welcome. Since we maintain no collection or library, almost all non-cash such items must be liquidated. An exception is items of archival value, of which materials we have historically maintained oversight and conservation.

Every donor intent on making a gift-in-kind should be prepared to sign a Deed-of-Gift attesting to full ownership and compliance with any collecting/transportation/trade regulations, briefly describing the gift, and agreeing to the COA's intended use of their donation. If the gift is accepted, the COA (the donee) will also sign the document. Typically such a document will occupy less than one full page.

Although it is widely understood that the proceeds from the sale of gifts-in-kind inure to an endowment dedicated to funding the Academic Grants Program, this disposition is also clearly expressed in the Deed-of-Gift. If a donor wishes to restrict such a gift to any other COA asset or program, such a request will be considered by the COA Board, but it is likely the gift will be deemed unacceptable.

COA has learned from recent experience that liquidation of such gifts can be a lengthy, complicated, and labor-intensive, and potentially costly process which might exceed our resources. Consequently some tendered gifts-in-kind may be too burdensome to process and may be declined. Examples of unsuitable collections may include those lacking scientific value, e.g., those in which many lots lack metadata, or, in the case of larger collections, those lacking a catalogue, preferably in digital electronic format.

Optimally all the donated items will be auctioned (silent and/or oral) at one or more of COA's annual conventions. Liquidation by other means such as direct sale (wholesale or retail) produces a greater drain on resources, is less profitable, and can incur conflict-of-interest issues as addressed in the COA Code of Ethics.

To oversee the processing of gifts-in-kind, at the time a gift is tendered the President will appoint a committee comprised of seven COA members, chaired by him and including the Treasurer, a member of the museum community, and three (3) individuals self-identified as commercial dealers in shells and/or malacological books. Aside from the President and Treasurer, no more or less than two (2) Board members will serve on the committee. The COA Gifts-in-Kind Committee will oversee the liquidation process from initial acceptance/rejection of any/all donations until all the merchandise has been sold. Coordination with COA Convention leadership will be a paramount responsibility in this oversight. The term of service concludes when the gift is liquidated. The committee is specifically charged with maximizing monetary yield to COA, while considering available human and other resources and maintaining the highest ethical standards as set forth in the COA Code of Ethics. A new committee will be formed *ad hoc* at the time any gift-in-kind is offered.

Since COA is a tax-exempt educational organization under the provisions of Section 501(c)(3) of the IRS Code, the donor may choose to declare a federal income tax deduction. Pursuant to current IRS guidelines, an independent appraisal must be performed on behalf of the donor for any gift-in-kind totaling over $5,000.00 in value during one year. The donee (COA) is explicitly forbidden to perform this service, and that proscription is interpreted to include members of COA Board of Directors and those of the COA Gifts-in-Kind Committee.

For in-kind donations involving a tax deduction by the donor, the COA will cooperate by executing the donee portion of IRS Form 8283 and will submit annual Forms 8282 as required by IRS. For in-kind donations claimed by the donor as tax-deductible, particularly those valuated in excess of $5,000.00, the COA will probably need to retain the collection in escrow for three years before liquidation begins. A secure, climate-controlled, yet easily-accessible repository will likely be required and can be costly. Such considerations will depend in turn on geographical location among other factors, and must be weighed by the COA Gifts-in-Kind Committee in determining whether to accept or decline, and how to dispose of, any tendered gift.

Let it be known hereby that COA encourages individuals, organizations, and scientific institutions to volunteer their labor and other resources to assist the organization with the complex process of managing and liquidating any gift-in-kind it might be tendered.

Conchologists of America

CODE OF ETHICS

Approved by the COA Board of Directors on 2 June 2017

Preamble

Conchologists of America (COA) is a tax-exempt, educational, non-profit organization under the provisions of Article 501(c)(3) of the US Internal Revenue Service Code (Tax ID 112541695).

Purposes of COA

"The purposes of this organization are to disseminate knowledge about mollusks, to encourage research on mollusks, and to increase the awareness of the need for preserving habitats and the health of molluscan populations through meetings, lectures, publications, grants, and exhibits."

Development of COA's Code of Ethics

In 2017, a committee consisting of José H. Leal (chair), Tom Eichhorst, Tom Grace, Richard Kirk, President Harry G. Lee (*ex officio*), and Treasurer Steven Coker (*ex officio*) was tasked by COA President Harry G. Lee to draft a Code of Ethics for the organization. This Code was revised and approved by COA Board of Directors (BOD) on the date indicated above.

Objectives of the Code of Ethics

- The Code identifies core values on which COA's Purposes are based;
- The Code summarizes broad ethical principles that (1) reflect the core values stated in COA Purposes above and (2) establishes a set of specific ethical standards that should be used to guide the BOD, employees, volunteers, and, to some extent, the COA Membership and shell collectors at large;
- The Code provides ethical standards to which the general public can hold COA and its BOD accountable.

Governance

The BOD holds the ultimate fiduciary responsibility for the institution. The COA Constitution and Bylaws explain this and other attributions of the BOD in detail.

Additionally, the BOD will foster and monitor the financial structure of COA, such that COA continues to exist in perpetuity as a vital, dynamic, relevant, and first-class organization that represents the interests and needs of shell collectors, students, researchers, citizen scientists, and society in general.

Board of Directors Ethics

Elements of this document that are directly relevant to the ethical behavior of the BOD, as a whole or as it applies to its individual members, include, but are not exclusive to: molluscan conservation, conflict of interest, intellectual property, equal employment opportunity, and discrimination and harassment policy.

Molluscan Conservation

COA strongly supports informed management and conservation policies for mollusks, and formally adopted the following Resolution for Responsible Scientific Collecting on June 26, 1995. Wording for the Resolution was composed by Dr. Gary Rosenberg (Academy of Natural Sciences of Drexel University). The Resolution was first published on the back cover of the September 1995 issue of the *American Conchologist*:
"Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological and cultural importance to humans, and Whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and Whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats." This resolution has appeared on page 2 of every issue of *American Conchologist* since September 1996.

Conflict of Interest

Conflict of Interest is a situation in which someone in a position of trust has a competing professional or personal interest. Such competing interests can make it difficult to fulfill his or her duties impartially. A conflict of interest exists even if no unethical or improper act results. For management and governance purposes, there is no difference between conflict of interest and the appearance of conflict of interest, as the latter condition may easily develop into the actual conflict.

No individual may use his or her COA director position or property for his or her personal gain or to benefit another, or act in a way that hints at the appearance of conflict of interest.

No more than one member of a family (spouse, life partner, sibling, parent, or child) may serve as a director simultaneously. It is understood that certain *ad hoc* committees, not exclusively comprised of Directors, may include more than one family

member under special conditions and considerations, e.g., that six *Neptunea* Awards were given to couples for their service to COA, but in voting matters only a single ballot may be cast by them.

Furthermore, no director is to have a financial interest in, or to receive any compensation from any agency, vendor, or supplier when performing business transaction on behalf of COA. It is the policy of this organization that all directors undertake their respective responsibilities with an unbending duty of loyalty and fidelity consistent with a fiduciary relationship. This means that directors must administer the affairs of this organization honestly and economically, exercising their best care, skill, and judgment for the benefit of COA.

Whenever a matter arises for action by a BOD member, employee, or volunteer engaging in an activity where there is a possible conflict of interest or the appearance of conflicts between the interests of COA and an outside or personal interest of the individual, the outside interest of this BOD member, employee, or volunteer should be made a matter of record. In such cases where a BOD member is present in a BOD meeting when a vote is taken in connection with such a question, he or she should abstain. Sometimes neither disclosure nor abstention is sufficient for a BOD member and the only appropriate solution is resignation from the BOD.

Intellectual Property

COA will in principle hold the rights to all work products, inventions, discoveries, copyrightable works, and other developments conceived or performed by BOD members on behalf of the organization.

Equal Opportunity Employment

Despite the fact that COA daily chores are performed mostly by members of its BOD and other volunteers, COA may eventually hire employees to perform specific tasks. COA Directors will treat all colleagues, volunteers, and employees and applicants for employment equally, without regard to race, color, religion, gender, pregnancy, age, physical or mental disability, national origin, or any other characteristic protected by state or federal law. COA bases all employment decisions on the candidates' qualifications. This applies to other employee actions such as compensation, benefits, discipline, terminations, lay-offs, and training.

Discrimination and Harassment

Any form of harassment is a violation of COA policy. The institution recognizes a broad definition of that term.

Statement of Collecting Ethics

The sensible and ethical collecting of shells and mollusks brings value to the scientific and educational programs that advance the stated COA Purposes. COA therefore adopts the following standards for collection of specimens: (1) Prior notification was made and permission or appropriate permits were secured from landowners, managers of private or public lands and parks and other appropriate authorities and agencies where applicable. (2) All collecting was in compliance with federal, state, and municipal laws and regulations applied to fossil, mollusk, and shell collecting.

Code of Ethics – Appendix 1

DOCUMENT DESTRUCTION AND RETENTION POLICY

Introduction

COA records are important assets. COA records essentially include all documents, whether paper or electronic, produced by the Board of Directors (BOD), staff, and/or volunteers while in the performance of their assignments and responsibilities.

Document Destruction and the Law

The Sarbanes-Oxley Act addresses the destruction of business records and documents and turns intentional document destruction into a process that must be carefully monitored. The law requires COA to maintain certain types of records, usually for a specified period of time. Failure to retain those records for those minimum periods could subject the BOD to penalties and fines, cause the loss of rights, obstruct justice, spoil potential evidence in a lawsuit, place COA in contempt of court, or seriously disadvantage COA in litigation.

Exceptions

COA expects all Directors, employees, and volunteers to fully comply with any published records retention or destruction policies and schedules. Directors, employees, and volunteers should note the following general exception to any stated destruction schedule: If you believe, or COA informs you, that those records are relevant to litigation, or potential litigation (i.e., a dispute that could result in litigation), then you must preserve those records until the President, or COA's legal counsel, determines the records are no longer needed. That exception supersedes any previously or subsequently established

destruction schedule for those records. If you believe that the exception may apply, or have any questions regarding the possible applicability of that exception, please contact the President.

Policy Revision and Additional Records

COA may establish revised retention or destruction policies or schedules for specific categories of records in order to ensure legal compliance, and also to accomplish other objectives, such as to preserve intellectual property and cost management. Several categories of documents that bear special consideration are identified in the COA's Records Retention Schedule, a copy of which is attached below. While minimum retention periods are suggested in the Records Retention Schedule, the retention of the documents identified therein and of documents not included in the Records Retention Schedule should be determined primarily by application of the general guidelines affecting document retention identified above, as well as any other pertinent factors.

Compliance

Failure to comply with this Document Retention Policy may result in punitive action against the Director, employee, or volunteer, including suspension, termination, or litigation. Questions about this policy should be referred to the BOD, who is in charge of administering, enforcing, and updating this policy.

Record Retention Schedule

The following table provides the minimum requirements for record retention at Conchologists of America.

Type of Document	Minimum Requirement
Accounts payable ledgers and schedules	7 years
Audit reports (external)	Permanently
Bank Reconciliations	2 years
Bank statements	3 years
Checks (for important payments and purchases)	Permanently
Contracts, mortgages, notes and leases (expired)	7 years
Contracts (still in effect)	Permanently
Correspondence (general)	2 years
Correspondence (legal and important matters)	Permanently
Correspondence (with customers and vendors)	2 years
Deeds, mortgages, and bills of sale	Permanently
Depreciation Schedules	Permanently
Duplicate deposit slips	2 years
Employment applications	3 years
Expense Analyses/expense distribution schedules	7 years
Year End Financial Statements	Permanently
Insurance Policies (expired)	3 years
Insurance records, current accident reports, claims, policies, etc.	Permanently
Internal audit reports	3 years
Inventories of products, materials, and supplies	7 years
Invoices (to customers, from vendors)	7 years
Minute books, bylaws and charter	Permanently
Patents and related Papers	Permanently
Payroll records and summaries	7 years
Personnel files (terminated employees)	7 years
Retirement and pension records	Permanently
Tax returns and worksheets	Permanently
Timesheets	7 years
Trademark registrations and copyrights	Permanently
Withholding tax statements	7 years

2017 COA Convention

Key West, FL, August 15-19, 2017

By Jeannette Tysor and Ed Shuller

The 2017 COA Convention is fast approaching. There are many special reasons to attend this year's convention, so if you have not yet registered, do it today - it is not too late.

Schedule

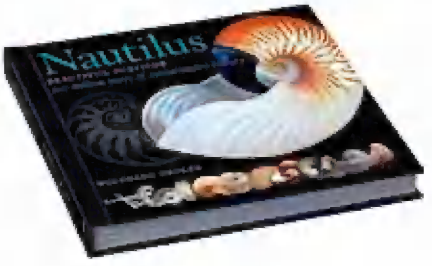
Tue. Aug. 15	
Registration	
Silent Auction 1	8:00 to 9:30 am
Opening Session	10:30 am
Opening Speaker	11:00 to noon
Lunch	Noon to 1:30 pm
Silent Auction 2	in afternoon
Programs	1:30 to 4:30 pm
Welcome Party	6:00 to 9:00 pm
Welcome Party Silent Auction bidding	6:00 to 8:00 pm
Welcome Party Silent Auction pickup	8:00 pm
Wed. Aug. 16	
Registration	
Silent Auction 3	8:00 to 9:00 am
Programs	9:00 to noon
Lunch	Noon to 1:30 pm
Silent Auction 4	in afternoon
Programs	1:30 to 4:30 pm
Oral Auction preview	6:00 to 7:00 pm
Oral Auction	7:00 pm until
Thu. Aug. 17	
Registration	
Silent Auction 5	8:00 to 9:00 am
Programs	9:00 to noon
Lunch	Noon to 1:30 pm
Programs	1:30 to 2:45 pm
Business Meeting	3:15 to 4:30 pm
Social - Banquet	6:00 to 10:00 pm
Fri. Aug. 18	
Club Rep Breakfast	8:00 to 10:00 am
Bourse	1:00 to 8:00 pm
Sat. Aug. 19	
Bourse	9:00 to 3:00 pm

Three silent auction pickups on Wednesday and Thursday. The final on Friday morning.

Programs

Program Chair Carole Marshall has arranged an outstanding group of speakers and topics.

We are very fortunate to have **Wolfgang Grulke** as our opening speaker. Mr. Grulke is an author and businessman with an unbridled passion for the natural world. For the past decade he has applied his sense of wonder to the distant past, especially our fossil history. He has recently released a book on the Nautilidae entitled *Nautilus: Beautiful Survivor*. The chambered nautilus is one of the oldest living things on our planet. Since the dawn of civilization its form has inspired artists, designers, and architects. *Nautilus* has survived whatever the world has thrown at it for more than 500 million years, persisting even as dinosaurs and many other life forms vanished. This talk and Wolfgang's new book celebrate the long history of *Nautilus*, its role in human culture and the realities of its life today. Following his presentation, Mr. Grulke will be available to autograph books. Since its publication all proceeds from the sale of this book have gone toward *Nautilus* research.



Following lunch on Tuesday, **Clint Curry** will speak on Key West. As one of the latest in a long line of "Conchs" he has much information on the town and its people to share with us.

Other speakers and topics not to miss:

Eugene Coan, author of many books and papers on mollusks and co-author with Paul Valentich-Scott on the two volume *Bivalve Seashells of Western North America* will speak on Peruvian bivalves, the subject of a new book to be released by both authors.

For fossil enthusiasts, **Gary Schmelz** will share his knowledge of "Fossil Wonders." Gary is the former Director of the Big Cypress Nature Center and Director of Education for the Conservancy of S.W. Florida.

For lovers of aquatic life in the Keys, **Nicole Uibel** from the Florida Marine Sanctuary will give us an update on the success of the Sanctuary since its formation.

Sanibel is heaven for many shellers. **Dr. José Leal**, Science Director and Curator for the Bailey-Matthews National Shell Museum, will describe some new species from Sanibel.

How many shells have musical names? In his presentation on "Musical Molluscs," **Tom Ball** will give us an overview of the musical instruments, musicians, bands and musical terms that are represented in the world of molluscs.

Phil Fallon, independent researcher with an interest in turrids, recently published a *Taxonomic review of tropical western Atlantic shallow water Drilliidae including descriptions of 100 new species*.

Most of us are aware of the prominence of the Philippine Islands in shelling. **Jim** and **Linda Brunner** will speak about "The Rise and Fall of the Tangle Net Industry."

These are a few of the speakers you will hear. There are 19 presentations in all, scheduled during the convention.

Welcome Party Silent Auction

A new feature this year will be a special silent auction during the Welcome Party Tuesday evening. This auction will feature a limited offering of items, many of oral auction quality. A minimum bid will be noted on the bid sheet. At 8:00 pm time will be called on bids. Winning bidders will pick up the items they have won and take them to the checkout table for payment.

Oral Auction

Wednesday night will be the most anticipated COA auction in memory. The donation by the Weiss family to COA of a very large collection of specimens of unusual size, quality, and rarity has drawn much attention. A full color catalog for the auction will be given to each person registered for the convention. The production of the catalog involved Donald Dan personally driving from Ft. Myers to Wilmington, NC, to deliver the specimens to John Timmerman to photograph.

Raffle

Several very nice items will be offered on the raffle. Among them will be a "species themed" shell lamp by NC Shell Club lamp creator Harold Brown. You may remember his pair of *Scaphella dohrni* lamps offered at the 2014 COA Convention. This time the lamp is filled with only Sozon's cone (*Conus delessertii*.)

From Anne Joffe is a 15 inch wedding valentine done with all white shells.

Donald Dan has made available to the raffle a set of nine *Swiftopecten swiftii* from the Weiss collection, each with a different color pattern and all of specimen quality and similar in size.

Banquet

The Thursday evening banquet will feature a buffet with a wide selection of regional favorites. The highlight of the evening will be a presentation by Rich Goldberg of pictures and anecdotes recalling the 1980 COA Convention in Key West. The banquet concludes with drawing for the raffle prizes.

See You in Key West!

CONCHOLOGISTS OF AMERICA, INC

To our Key West 2017 Conchologists of America (COA) Convention bourse vendors,

On behalf of COA I welcome you to Key West and the bourse. Your concessions are the highlight of this long-awaited event for many of us, and the organization is greatly appreciative of the contribution you make to the success of the event and COA as a whole.

You are probably aware that COA is on record as supporting efforts to conserve mollusks on a global basis, and, more recently to publicize, clarify, and interpret governmental regulation affecting the importation and trade of shells (Wolfe and Lee, 2017).

The Convention leadership, COA Board, and I urge you to be familiar with any governmental regulation, US or overseas, that may impact your bourse activities. If any species you possess falls under such legal jurisdiction, I urge you to have any permit or other pertinent documentation on hand. COA is not an agency of law enforcement, but we have the responsibility to ensure that our membership is aware of the law.

Now, set up, sell, exchange, and enjoy the world's largest and oldest shell bazaar!

Harry G. Lee

President, COA

May 2017

Wolfe, D.A. & H.G. Lee, 2017. A review of national and international regulations concerned with collection, importation and exportation of shells (Mollusca). *American Conchologist Supplement 1*: 1, 3-32. January 2017

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American CONCHOLOGIST

Quarterly Journal of the Conchologists of America, Inc.

CONCHOLOGISTS OF AMERICA, INC.

In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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MEMBERSHIP is for the calendar year, January-December, late memberships are retroactive to January. 2017 DUES: $25; postal surcharge: USA none ($5 additional for USA first class), $5 for Canada and Mexico (total of $30), $15 for all other countries (total of $40). New members apply to Karlynn Morgan, Membership Director. Please pay in U.S. dollars ($), or with a check on a U.S. bank with Transit Enrouting and Account Numbers printed at the bottom, or with money order. Make checks payable to: CONCHOLOGISTS OF AMERICA. Notify Membership Director with change of address.

BACK ISSUES are available from Karlynn Morgan, Membership Director. Prices: prior to 1999, $3 each, 2000 to 2008 $4 each, 2009 to current, $5 each; postage extra.

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In This Issue

Front cover: *Vokesimurex rubidus* (F.C. Baker, 1897) photographed *in situ* by Charles Rawlings in 2011, off Honduras. This is just one of the many muricids with name changes discussed by Dr. Emily Vokes (p. 4).

Back cover: *Popenaias popeii* (I. Lea, 1857), the Texas hornshell. This species is the last of what were once eight native unionid species in New Mexico. It is protected by the state (not federally, dispite years of attempts at such status for both the New Mexico and Texas populations) and is presently found only along an eight-mile segment of the Black River (a tributary of the Pecos River) in southern New Mexico. Photo from Joel Deluxe, Wikipedia.com

Editor's comments: This issue is another eclectic mix of shell-related articles. We start with a great article by Dr. Emily Vokes (p. 4), who presents a bit of insight into the muricid name game. After reading her article and working a bit to update my collection, I bought the most recent murex book - see my review of Roland Houart's *Living Muricinae of the World* on page 22. This is a fantastic reference.

Next is an interesting report on a study of the difficulties properly identifying freshwater Texas unionids (Robert G. Howells, Charles R. Randklev & Neil B. Ford, p. 9). The test described in this report points out the difficulty in identifying freshwater unionids as well as the need for serious study of this group if one is to be involved in unionid field work.

Lisa Fitzgerald then gives us a solid reason for owning shell books for purposes other than research and proper taxonomy. A fun read.

Next is my coverage of the Muricinae by Roland Houart (a great reference with hopefully more to come) and my report on the 2017 Key West COA Convention. It was a fun event.

Our "Memoriam" this issue has too many (again!). All are folks we will miss.

Next are two reports from COA grant winners. The first is an interesting land snail study on Belau (Republic of Palau, Oceania) in the Caroline Islands, by Teresa Osborne and Rebecca Rundell. Then we have Julieta Sturla Lompré, Erica Giarratano & Mónica Noemí Gil who studied arsenic in Argentinian scallops.

We end this issue with several shell show reports, including: the Gulf Coast Shell Club, the Marco Island Shell Club, the Keppel Bay Shell Club, and the San Diego Shell Club. The Sanibel-Captiva Shell Club report will be in the next issue (sorry Sanibel folks, ran out of room!).

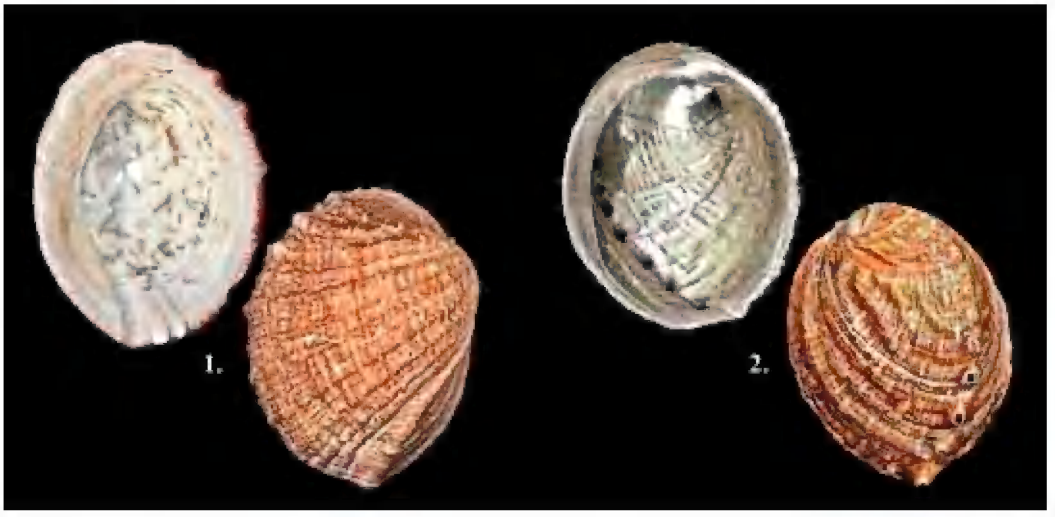
As one page "odds and ends" we have a photograph of the rarely seen deep-sea *Alviniconcha hessleri* Okutani & Ohta, 1988, from the Mariana Trench (Marvel form the Deep by Simon Aiken on p. 41). We also have the request for *Neptunea* Award nominations (p. 37) for 2018. Everett Long has graciously accepted the responsibility for this important COA program and he needs your help to identify people worthy of this award. All of the rules and nominating procedures are given by Everett on p. 37. Please note you are encouraged to resubmit a person if they have not previously won and you believe they are deserving of the award. Also note, current COA Board members are ineligible.

Hope to see everyone in **San Diego at COA 2018** (29 Aug-2 Sep)!

Tom Eichhorst

FIFTY YEARS OF LOOKING AT MURICES

Emily H. Vokes



The South American muricid 1. *Concholepas concholepas* (Bruguière, 1789) has evolved a similar morphology or physical appearance to the family Haliotidae, in this case, 2. *Haliotis gigantea* Gmelin, 1791. Images courtesy of Femorale.com.

More and more we are recognizing that convergence, the tendency of unrelated animals or plants to evolve superficially similar characteristics, is a molluscan problem. A prime example is the shells of abalones and the muricid *Concholepas* (now being sold as "Chilean abalone!"), which have both evolved to inhabit wave-battered, rocky shorelines. While this is an extreme case involving two very dissimilar families, similar convergent evolution can occur within a family between distinct genera – presenting quite a challenge to taxonomists. Obviously being armed with long spines deters predators and thus has an evolutionary advantage. The members of the gastropod subfamily Muricinae have taken this to an extreme, with the result that several different lines have evolved three spinose varices. Once upon a time these were all placed in the genus *Murex*, but we are now realizing this is also a prime example of convergence.

The original genus *Murex* was proposed by Linnaeus (1758) with a total of 58 species included, but it is clear that what he considered a "species" is more what we would consider a genus. Only nine of his species are today even in the family Muricidae, and they are now divided among seven genera in three subfamilies. Interestingly, seven of his nine species are types of their genus.* His concept of the genus comprised all species of gastropod with a (however slightly) extended siphonal canal. So it included not only such expected members as *Fasciolaria, Neptunea, Fusinus, Melongena, Ficus, Busycon, Cymatium*, and *Vasum*, but the less canaliculate forms like *Bursa, Ranella, Drupa, Distorsio,* and *Phos*. And the real ringers are *Cerithium, Potomides,* and *Rhinoclavis*!

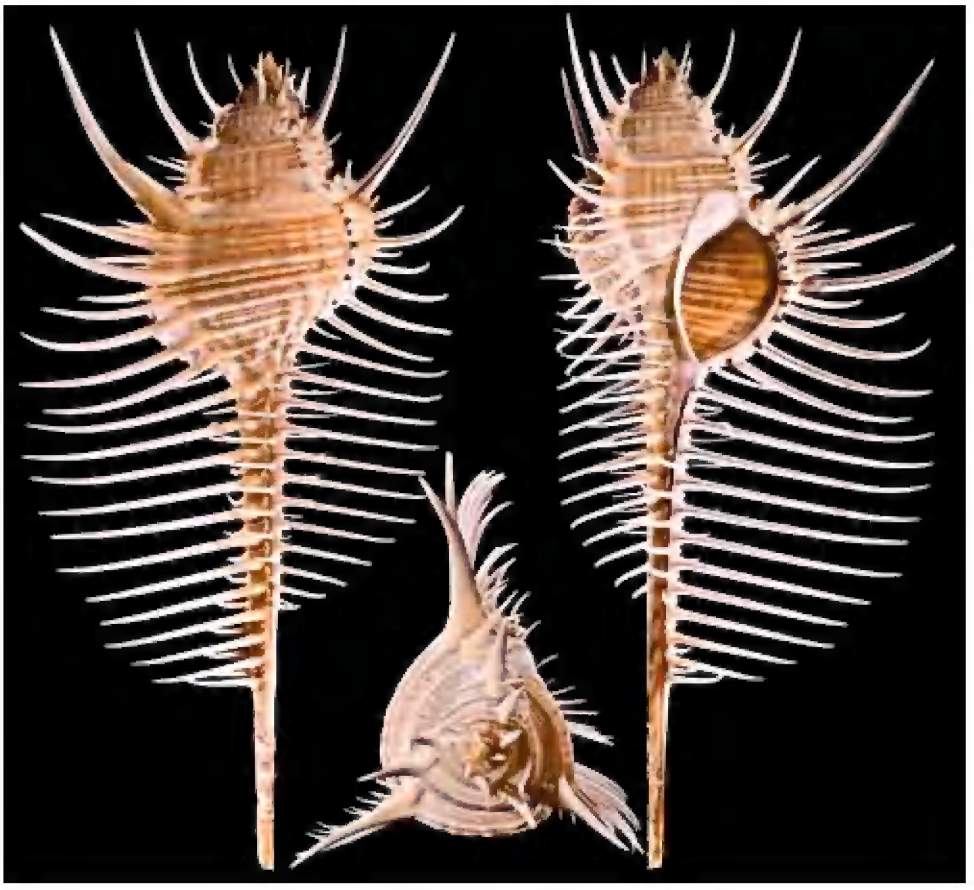
Of the 58 species today, only one, "*Murex tribulus*," would actually be considered a true *Murex*. For this name he cited ten illustrations from old iconographies (*Systema Naturae* had no illustrations), of which five are what today we call *Murex pecten* Lightfoot, 1786 (based on a single ref. to a Rumphius figure) and only three are actually true *tribulus*. So how do we know what is REALLY the true *tribulus*? Fortunately, there is a type specimen in the Linnaean Collection in London (Ponder and Vokes, 1988, fig. 5). Montfort (1810, p. 619) subsequently designated *tribulus* as the type of the genus *Murex*, and this is where we start.

Some 65 years passed and then Lamarck (1822) came up with what was essentially our modern classification for the next 150 years. Obviously still nothing like what we see today, but certainly better. He split Linneaus's species of *Murex* into their more familiar groupings, introducing such genera as *Fasciolaria, Fusus, Ranella*, and *Cerithium*. He then divided the now restricted genus *Murex* into three groups, the first said to have "a thin canal, longer than the aperture," which included six species that today are still included in *Murex*, plus three of Linnaeus's Muricinae (2 *Bolinus*, 1 *Haustellum*), and one species of *Siratus* (*Murex motacilla* Gmelin, 1791). The second group was said to have a "thick canal, more or less long," and comprises mostly species of *Chicoreus* and *Pterynotus*. His third group was those with more than three varices and is a truly mixed bag of *Hexaplex*

*The seven Linnaean types of their respective genera are: *Murex tribulus*; *Haustellum haustellum*; *Bolinus brandaris*; *Trunculariopsis trunculus* (now in *Hexaplex*); *Chicoreus ramosus*; *Homalocantha scorpio*; and *Ocenebra erinaceus*. His two muricids that are not types are *Murex cornutus* [now *Bolinus cornutus* (L., 1758) and *Murex saxatilis* Linnaeus (auctt.) [now *Hexaplex duplex* (Röding, 1798)].

and assorted others, but all pretty much still members of the Muricidae. For almost 150 years things rocked along generally in Lamarck's pattern with the various taxa usually considered as "subgenera" of *Murex*, such as *Murex* (*Chicoreus*), *Murex* (*Siratus*), *Murex* (*Phyllonotus*), *Murex* (*Pterynotus*), etc.

When I did my first study (Vokes, 1963) of the western Atlantic fossil and Recent species of what I called *Murex* s.s, I included 19 species. Subsequently, in my "Additions and Corrections" (Vokes, 1990), I had to confess that NONE were *Murex* s.s.; in fact there are NO species of *Murex* in the western Atlantic! My former "*Murex*" species were now divided into eight *Siratus*, nine of what I then called *Haustellum*, and one *Dermomurex* (*Takia*).



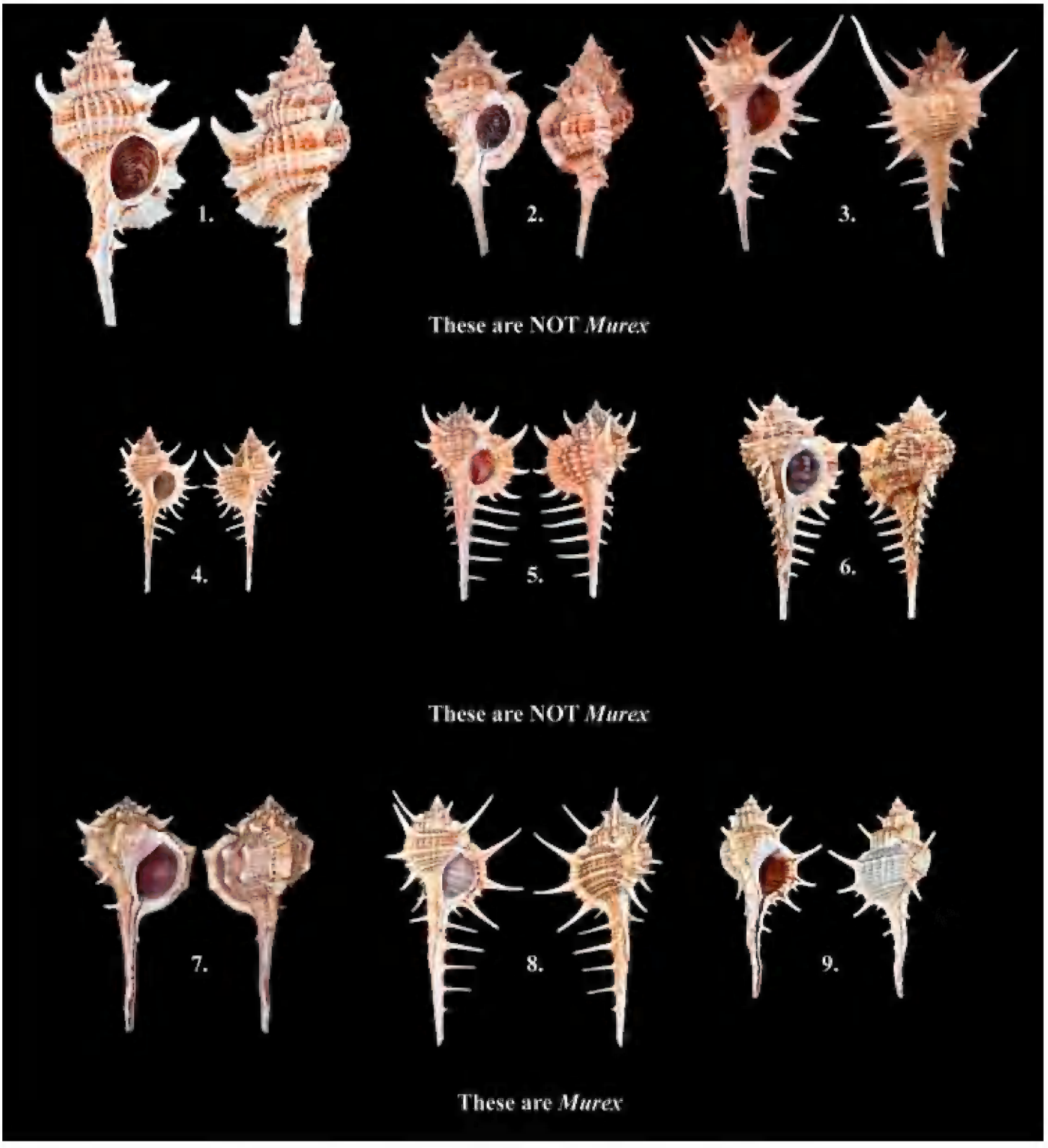
***Murex pecten* Lightfoot, 1786, a 175mm specimen from the Philippines. This is a true *Murex* and perhaps one of the most spectacular shells found in collections. People are almost always amazed when viewing this shell for the first time. Image from Wikipedia.com.**

In that original 1963 study I separated the so-called *Murex* species into two groups: the "Indo-Pacific" group, with a straight canal, and the "Western Atlantic" group with a bent canal. Actually I was closer to the truth than I realized. As I studied the various Recent species I quickly recognized that the **bent** siphonal canal readily separated this spiny, three-varixed *Murex*-looking group from the spiny, three-varixed, straight-canaled true *Murex*. And so in 1965, I transferred *Siratus* to *Chicoreus* (*Siratus*), where it remained until 1976 when Radwin and D'Attilio did away with all subgeneric designations and it became the genus *Siratus*.

But the rest of the so-called Murices, both Western Atlantic and Indo-Pacific, remained intact until my fateful trip to Australia in 1980. That year I had a sabbatical semester, which I spent working at the Australian Museum (Sydney). When I walked in the door Winston Ponder, the head of Mollusks, announced to me that WE were going to monograph the Indo-Pacific species of *Murex*, as part of that major series going on at the time. He had been slated to do the study, and for some time previous he had circled the world (literally) visiting museums to borrow types and other interesting material he uncovered in their collections. It was an amazing array of specimens awaiting me.

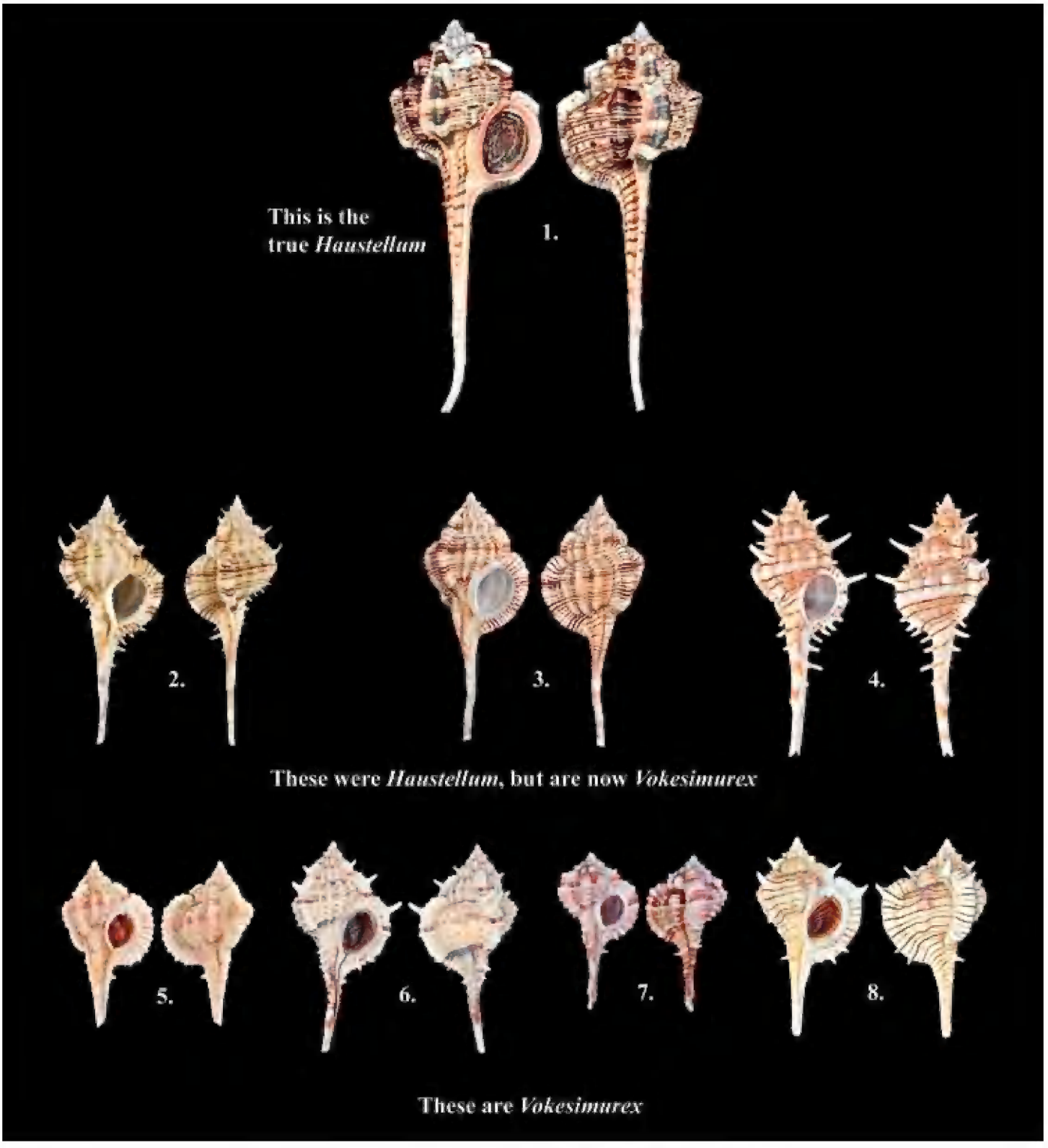
He informed me that my first job was to write up a GOOD description of each species, something which in fact was rather rare. And so for days I sat at a microscope and dictated my observations to my beloved amanuensis Harold. The goal was to have a description of each species in which the various features were all identically cited for ease of comparison between species. I had a mental format, in which I enumerated each of the various features in order, so that one could readily compare different forms. I ultimately wrote descriptions of 55 species. As we toiled away day after day, however, I began to realize that there were two very different sets of shell characteristics within the group of what we thought were all *Murex*.

Both groups have three spiny varices per whorl and long straight, spiny siphonal canals, and superficially all looked like what a *Murex* should be. BUT! The first thing I noted was that, although the protoconchs were indistinguishable, on the first couple of POST-protoconch whorls there were two very different patterns of development. One group has nine small angulate proto-varices; the other has twelve rounded axial ribs. On the second and third whorls, in the first group, every **third** "proto-varix" enlarges to become a true spinose varix. In the second group every **fourth** axial rib enlarges to a similar spinose varix. In the first case the remaining "proto-varices" persist as two intervarical ribs; in the second, there are three intervarical ribs. In the adult



Muricinae examples of: *Siratus*, *Vokesimurex*, and *Murex*.

1. *Siratus beauii* (P. Fischer & Bernardi, 1857) 100mm Caribbean. 2. *Siratus cailleti* (Petit de la Saussaye, 1856) 65mm Bahamas. 3. *Siratus formosus* (Sowerby, G.B. II, 1841) 70mm Dominican Republic. 4. *Vokesimurex blakeanus* (Vokes, 1967) 45mm Colombia. 5. *Vokesimurex cabritii* (Bernardi, 1859) 55mm Florida. 6. *Vokesimurex ruthae* (Vokes, 1988) 70mm Baja California. 7. *Murex brevispina* Lamarck, 1822, 70mm South Africa. 8. *Murex falsitribulus* Ponder & Vokes, 1988, 80mm Indonesia. 9. *Murex trapa* Röding, 1798, 65mm India. Images courtesy of femorale.com.



Muricinae examples of: *Haustellum* and *Vokesimurex*.

1. *Haustellum haustellum* (Linnaeus, 1758) 125mm Philippines. 2. *Vokesimurex dolichourus* (Ponder & Vokes, 1988) 70mm Madagascar. 3. *Vokesimurx hirasei* (Dautzenberg, 1915) 75mm Philippines. 4. *Vokesimurex kiiensis* (Kira, 1959) 79mm Japan. 5. *Vokesimurex bellegladeensis* (Vokes, 1963) 40mm Texas. 6. *Vokesimurex garciai* (Petuch, 1987) 65mm Honduras. 7. *Vokesimurex rubidus* (Baker, F.C., 1897) 40mm North Carolina. 8. *Vokesimurex tricornis* (Berry, 1960) 65mm W. Mexico. Images courtesy of femorale.com.

shells these numbers are more variable, anywhere from as many as nine to none as axial ribs are added or removed.

Using this distinction I then discovered that there were other differentiating characteristics. In group 1 the shell is usually monochromatic (cream to tan); group 2 often has broad brown spiral bands. More importantly group 1 **always** has a labral tooth, group 2 does not. But in group 2 the inner lip is expanded, usually with rugae. It turns out that group 1 comprises the species previously referred to *Murex* s.s, but group 2 now needed a new home. The other group that shares the differentiating features of the early development, brown spirals, and expanded inner lip is the genus *Haustellum,* so we concluded our study by removing those former members of *Murex* s.s. to *Haustellum*. I followed this scheme when I did the revision of the Western Atlantic "Murex" I mentioned previously.

The type of *Haustellum* is unfortunately far different from those we included and so not long after, Petuch (1994) cut the Gordian knot by describing yet another new genus to accommodate the not-quite *Haustellum* species. And this is where we now stand. I suspect that Merle or someone will soon erect a new genus for the Indo-Pacific species that Ponder and Vokes placed in *Haustellum* and we presently place in *Vokesimurex*.

In summary:

Linnaeus (1758) had 58 species of "*Murex*," including only:
- 1 *Murex* s.s.
- 1 *Haustellum*

Lamarck (1822) had 68 species of "*Murex*," including only:
- 6 *Murex* s.s.
- 1 *Haustellum*
- 1 *Siratus*

Radwin and D'Attilio (1976) had 27 species of "*Murex*," which included:
- 10 *Murex* s.s.
- 15 *Vokesimurex*
- 2 *Chicoreus*

Ponder and Vokes (1988) had:
- 27 species of Recent *Murex* s.s.
- 17 *Haustellum* (which really included only 4 *Haustellum* s.s. and 13 *Vokesimurex*)

Houart (2014) (the definitive study to date) had:
- 37 *Murex* s.s. - ALL Indo-Pacific
- 13 *Haustellum* s.s. - ALL Indo-Pacific
- 38 *Vokesimurex* - 21 West Atlantic or East Pacific
  17 Indo-Pacific
- 30 *Siratus* - all but 2 West Atlantic

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Accuracy of Freshwater Mussel Identification: Results from a Study in Texas

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Freshwater mussels (family Unionidae) are recognized both as important barometers of environmental quality and one of the most rapidly declining faunal groups in North America, where the most diverse species assemblage occurs. Freshwater mussels can be extremely challenging to identify, however. Not only do many produce morphologically distinct sizes, ages, and sexes, but some display numerous unique ecophenotypes (i.e., different forms in different environments). Often physical differences within a species are greater than the distinctions between two species. Such issues are particularly problematic in Texas, where there are not only many distinct ecosystems, but a large number of isolated drainage basins as well (unlike some states where all waters are those of the Mississippi), both of which complicate mussel identification.

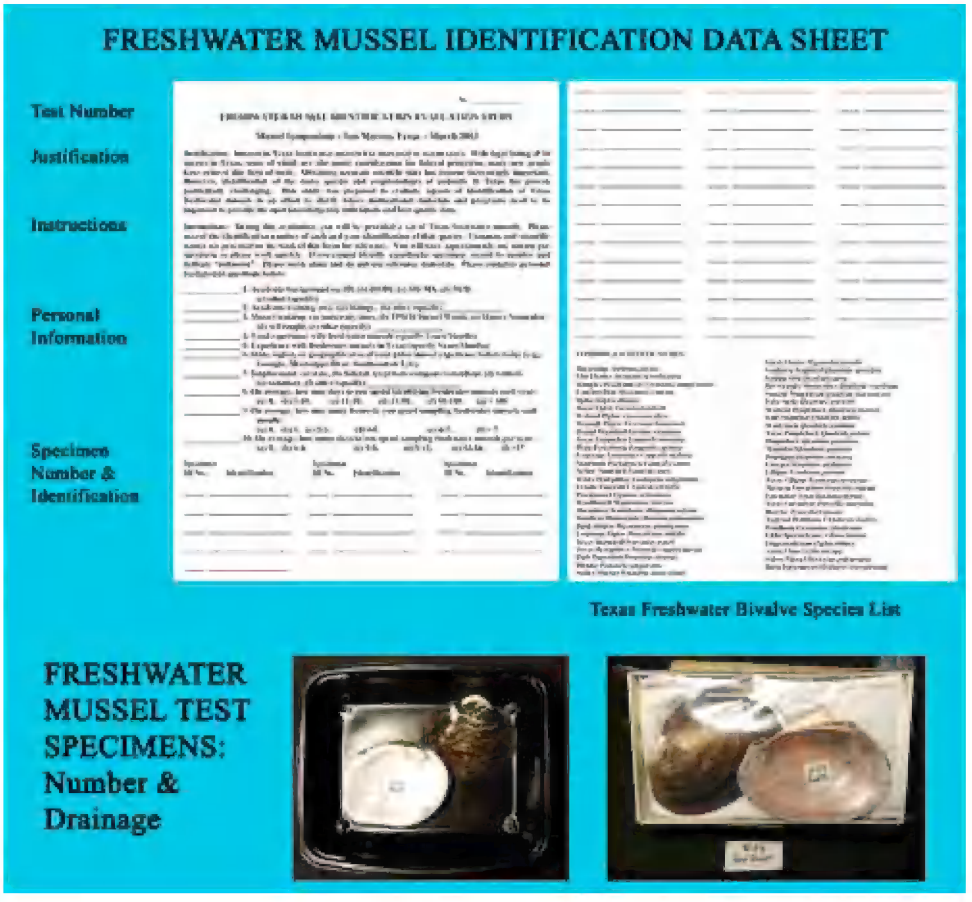

Figure 1. Data sheets used to test the accuracy of freshwater mussel identification by individuals attending a symposium in Texas in 2013. The sheets only identified test subjects by number, but included justification, instructions, an array of personal data, and a list of common and scientific names of bivalves found in fresh water in Texas. Test specimens were placed in trays, except that fragile shells in padded bags, to allow interior and exterior valve examination and only included a number and drainage basin.

Because of the rarity and apparent declines in abundance of Texas unionids, Texas Parks and Wildlife Department (TPWD) moved to list 15 species as legally threatened in 2010. U.S. Fish and Wildlife Department also began to investigate possible federal listing for many of these as well. Legal listing and associated implications soon brought increased interest in Texas freshwater mussels, as well as funding from a number of sources to support new studies. In turn, academic institutions, private consultants, and others stepped up to initiate work in the field. The rush of new people and some resultant work products prompted questions about the quality of some recent efforts.

Despite challenges associated with identification of freshwater mussels, there have been few efforts to document the quality of identification efforts. Shea et al. (2011) examined this subject during a meeting in the Southeastern U.S. (Table 1). Their work included a single drainage basin, the Apalachicola-Chattahoochee-Flint, and included 27 species and 18 biologists. They found an error rate of about 40-50% among individuals with less than 3-4 years of experience.

In an effort to examine the accuracy of freshwater mussel identification in Texas, the authors prepared a group of 52 specimens (50 unionids, Asian clam, and zebra mussel) representing 36 species from drainages throughout Texas (Table 1). Specimens were typical representatives

of each species (no atypical or trick examples), but sometimes included large or small shells. Each was marked only with a number and drainage basin and displayed in an open tray, except fragile species that were presented in a plastic bag to resist breakage during examination. Individuals attending a freshwater mussel symposium in San Marcos, Texas, in 2013 were asked to anonymously identify these shells. Attendees were not informed in advance and were not permitted to use identification guides. All subjects were provided an answer sheet that included (1) a sheet number, (2) justification, (3) instructions, (4) personal background information, (5) blanks to be filled in, and (6) a list of common and scientific names of all bivalve mollusks recognized in Texas inland waters (Fig. 1). Several months later, the authors were themselves tested by another biologist using the same group of test specimens. Collectively, 51 individuals working with Texas freshwater bivalves were tested. Later in 2013 at a mussel training class in Junction, Texas, another group of individuals was tested both before and after a week-long training session. Results were presented at the Third Annual Texas Freshwater Mussel Symposium, Kerrville, Texas, in August 2014 (Howells et al. 2014).

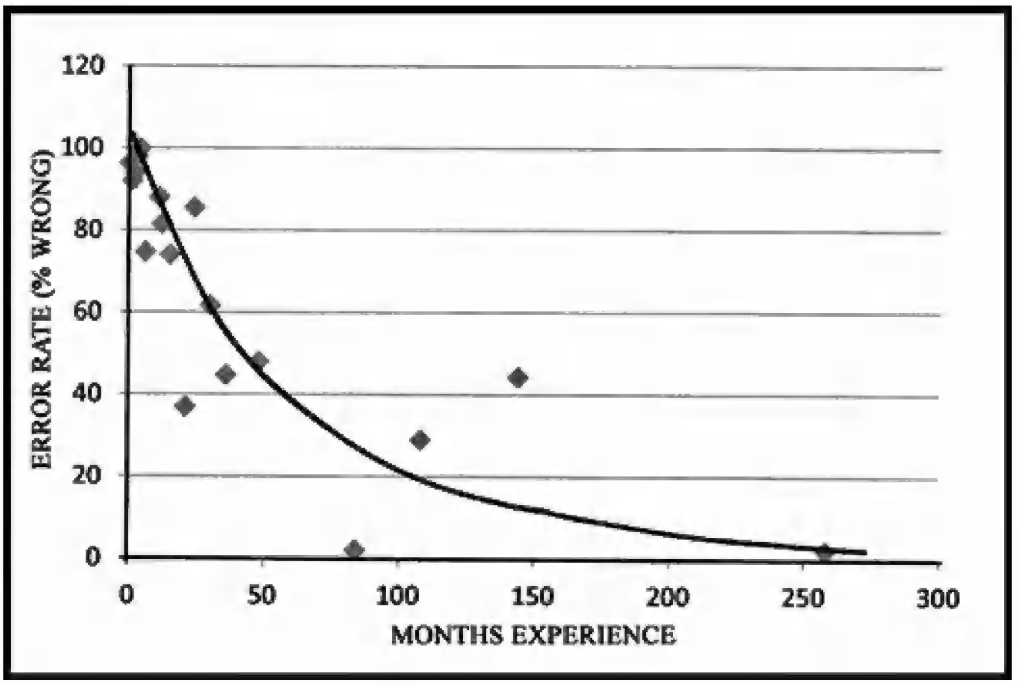

Figure 2. Error rate analysis of freshwater mussel identifications among 51 individuals tested in 2013 in Texas found 4-6 years of experience were needed to exceed a 40-50% error rate.

General Findings:

Identification accuracy was surprising low (Table 2). Less than 24% were correctly identified, with 28% misidentified, and 48% unidentified among all individuals tested. Test subject affiliations impacted accuracy with correct identifications averaging 91% among those from academic institutions, 25% for state employees, 28% for federal employees, and only just over 12% correct for environmental and engineering consultants. Academic degrees also reflected on the accuracy of freshwater mussel identifications with just over 20% correct for bachelor's degrees, less than 28% for master's degrees, and under 19% correct for Ph.Ds. Further, there was one 98% correct score with each advanced academic group and, if those scores were dropped as outliers, percent correct for each group dropped to 15%, 24%, and 8%, respectively. Low scores at the doctoral level may have reflected a small number of subjects in this group and individuals with more administrative and less hands-on roles. Years of experience with freshwater mussel work also impacted accuracy. Experience of 4-6 years was found to be necessary to exceed a 40-50% error rate (Fig. 2).

Group and Species Identification:

Because of issues related to rarity and legal status, we examined accuracy of identification of common, widely-distributed species and those listed as legally threatened by TPWD. Among 1,734 possible identifications of common species, less than 24% were correctly identified (Table 3). Among 816 possible identifications of listed unionids, just less than 21% were correctly identified. Results by individual species were also generally similar for species within these two groups, with correct identifications typically ranging from just over 17% correct to less than 35%. Curiously, giant floater (*Pyganodon grandis*), one of the most widely distributed and often extremely abundant unionids nationwide, was positively identified by less than 8% of people tested (Table 3). No clear reason for failure to identify such a common species was apparent.

Reasons for misidentification by species were sometimes evident, but in other cases were unclear and even suggested simple guessing. Note that incorrect species identification can include two types of errors, for example, when a species like threeridge (*Amblema plicata*) is (1) mistakenly thought to be another species (a Type II error) or (2) when another species is incorrectly assumed to be a threeridge (a Type I error). In fact, with threeridge, both types of errors occurred. Threeridge was correctly identified over 34% of the time, but was misidentified over 28% of the time when it was mistaken for 10 other species (Fig. 3). The most common misidentification was as washboard (*Megalonaias nervosa*), a species that is similar and confusion is not uncommon, but many other species falsely designated as threeridge

often had little resemblance to it. Further, seven species were falsely believed to be threeridge. These included washboard (again, an understandable mistake), as well as others that are distinctively different and completely illogical choices.

For Texas fatmucket (*Lampsiis bracteata*), a rare species endemic only to central Texas that is legally listed, nearly 20% were correctly identified, but nearly 26% were misidentified (Fig. 4). Texas fatmucket was incorrectly reported to be six other species and 10 different species were falsely believed to be Texas fatmucket. The test specimen was most often mistakenly thought to be Louisiana fatmucket (*L. hydiana*); again, not an unexpected mistake due to similarity in appearance. It is more difficult, however, to explain confusing it with fawnsfoot (*Truncilla donaciformis*) from eastern Texas, or pimpleback (*Quadrula pustulosa*) from northern Texas, neither of which even vaguely resemble Texas fatmucket. Similar comments apply to the 10 taxa wrongly thought to be Texas fatmucket.

Bogus Names and Species:

Although test subjects were given a list of accepted common and scientific names based on those accepted by the American Fisheries Society and Freshwater Mollusk Conservation Society, some individuals creatively opted to use other names. For example, threeridge was sometimes improperly called "three-ridge", "threeridge mussel", or even "3-ridge mussel". We scored these as correct responses (the respondent knew what the specimen was, but expressed its name poorly). Hybrid names like "Texas wartyback" were rejected as were simple genera (e.g., *Fusconaia* sp.) and group terms like "*Fusconaia/Pleurobema.*"

Identifications of Species Not Found in Texas:

Despite being given a list of species from Texas, a number of participants identified test specimens as species that do not occur in or near Texas. These included eastern pearlshell (*Margaritifera margitifera*) from northeastern North America, spectaclecase (*Cumberlandia monodonta*) and pocketbook (*Lampsilis ovata*) from the upper Mississippi Valley, and spike (*Elliptio dilatata*) from waters north and east of Texas (but admittedly with a single unsuccessfully introduction locally in the 1960s). Failure to recognize species present in Texas (even when clearly given) or the known ranges of non-Texas species led to misidentifications.

Reasons for Misidentifications:

- Multiple drainage basins and varied environments: Though difficult to quantify, the large number of isolated drainages that include many distinct environments, often with an abundance of variable ecophenotypes contributes to challenging identification problems.

- Species names: A number of participants incorrectly assigned species identification based on associating physical appearance with scientific or common name. For example, southern mapleleaf (*Quadrula apiculata* – Fig. 5) has small pimple-like pustules on the disk. This led some subjects to identify it with species names that reflected its sculpturing: wartyback, smooth pimpleback, Texas pimpleback, pimpleback, western pimpleback, and threehorn wartyback. One misidentified Asian clam was reported to be conchos disk (*Disconaias conchos*), apparently due to the drainage of its collection site (i.e., Concho River). All such errors suggest poor attempts at educated guessing rather than solid species familiarity.

- Sculpture: Shea et al. (2011) found the unionids in the Southeast were six times more likely to be misidentified than sculptured species. We did not find this in Texas. Sculptured mussels were correctly identified by over 18% of the subjects, but misidentified by over 83%. Unsculptured species tallied just over 19% and 81%, respectively. Presumably, the multiple drainage basins and ecosystems and associated varied ecophenotypes confound the value of sculpturing as a diagnostic tool in Texas (Fig. 5).

- External coloration: Shea et al. (2011) found distinctive color patterns improved the probability of identification accuracy in the Southeast. Again, we failed to find support for this in Texas, presumably also due to the large number of basins, ecosystems, and ecophenotypes that obscure the value of this trait in Texas (Fig. 5).

- Specimen size: This study did not include enough very small or juvenile specimens to compare to larger adults to allow confident conclusions about size impact on identification accuracy. Physical difference between small individuals and much larger animals in addition to differences among juveniles from different populations likely do confound attaining correct identifications.

- Subject geographic experience: An interesting source of error was found among individuals that trained in other regions of the U.S. compared to those that gained experience locally in Texas. For example, biologists with background history in the eastern or southeastern parts of the country were more often inclined to misidentify local Texas pigtoe (*Fusconaia askewi*) or Louisiana fatmucket (*L. hydiana*), that only occur west of the Mississippi River, as Gulf pigtoe (*F. cerina*) or southern fatmucket (*L. straminea*), respectively, that are only found east of the Mississippi. Test subjects defaulted to those species that were most familiar. Additionally, individuals that train and work primarily in one part of Texas were more likely to misidentify specimens from other regions (e.g., a biologist from the East Texas pineywoods might struggle to recognize unionids from Central Texas or the Rio Grande).

- Failure to recognize distributional data: Although many individuals submitting proposals for funding often claim there is little known about unionid distribution in Texas, historic and present ranges of Texas unionids are, in fact, very well described (Howells 2010, 2013). Many misidentifications clearly indicated a failure to recognize known

Figure 3. Among the common, widely-distributed species used in mussel identification accuracy testing in 2013, threeridge (*Amblema plicata*) was only accurately identified 34.3% of the time. It was misidentified as 10 other species (and *Quadrula* sp.). Additionally, six other species were mistakenly identified as threeridge. Number of misidentifications are indicated above in parentheses.

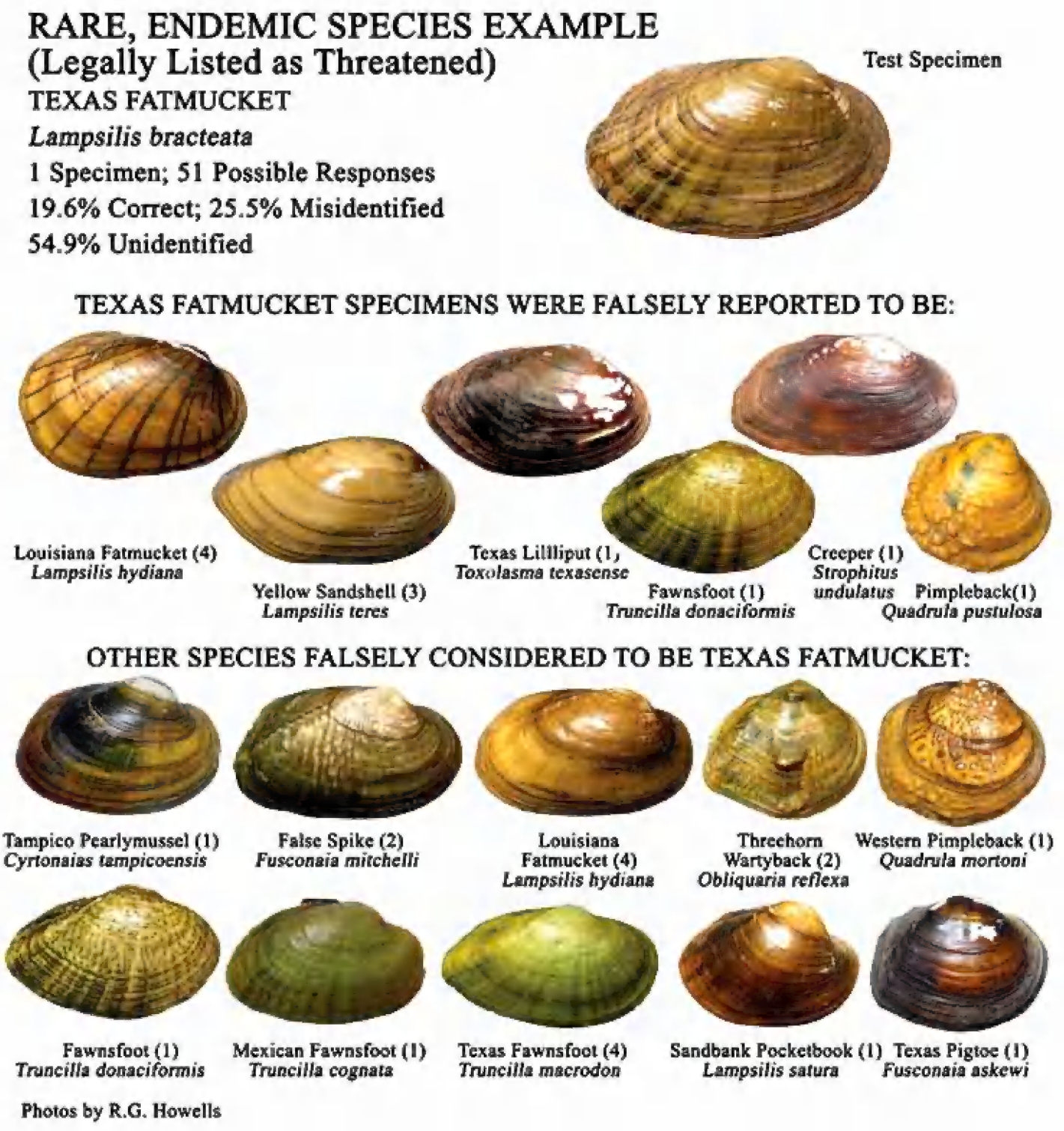

Figure 4. Among the rare, endemic species listed as legally threatened used in mussel identification accuracy testing in 2013, Texas fatmucket (*Lampsilis bracteate*) was only accurately identified 19.6% of the time. It was misidentified as six other species. Additionally, 10 other species were mistakenly identified as Texas fatmucket. Number of misidentifications are indicated above in parentheses.

species distributions that would have impacted identifications. Each test specimen included the drainage from which it had been collected, yet some test subjects incorrectly believed certain shells to be species that do not occur anywhere near the collection site indicated.

Impact of Training on Identification Accuracy:

During a training class in August 2013, identification accuracy of an additional group of subjects was tested both before and after training. Nineteen individuals (7 state/federal, 5 university, 7 consultants) were asked to identify 29 specimens of 23 bivalve species (13 legally threatened and 10 non-listed). Pre-training results indicated a mean of 28% (range 0-90%) correct identifications. After five days of intense training, post-training retesting found an average of 55% (28-90%) were correctly identified. Although this sample size was limited, multiple days of training by experienced unionid experts approximately doubled identification accuracy. This finding, though not unexpected, suggests caution regarding identifications from individuals with limited training or none at all.

Conclusions:

Clearly misidentification rates were far too high for virtually all groups of individuals involved in work with freshwater mussels and need to be improved. Error rates are especially high for individuals with less than 4-6 years of experience. Advanced academic degrees do not guarantee more accurate work. Identification problems are more pronounced at locations in Texas for individuals that trained in other parts of the country or other regions of Texas. Failure to recognize known distributional ranges of unionid species contributes to many misidentifications. Many individuals appear to guess at identifications, sometimes based on common or scientific names that appear to reflect the physical nature of a specimen in question (see Fig. 5). Multiple days of intense training can significantly improve the accuracy of unionid identifications.

Allowing participants more time with each specimen, use of reference manuals, and input from others would likely have increased identification accuracy. During actual field work, however, time to process specimens and available reference materials are often limited. This study also utilized shells with both internal and external valve examination. Living animals where internal valve features cannot be observed will be even more difficult to identify and error rates would be expected to increase. Identification of land or freshwater gastropods or marine mollusks, particularly non-native taxa, is likely to be even more complicated. Finally, we regret not asking each participant to evaluate their own species identification abilities prior to being tested.

Recommendations:

Training is both recommended and apparently often badly needed. Individuals working with unionids must become more familiar with known distributions and the extent of ecophenotypic variations. It is necessary to recognize that some unionids cannot be positively identified based only on external shell features; either internal features or biochemical genetic examination may be necessary. Funding agencies need to consider the experience of individuals and groups requesting support. Quality of data and information presented by individuals and groups also needs to be viewed through the filter of their experience by all.

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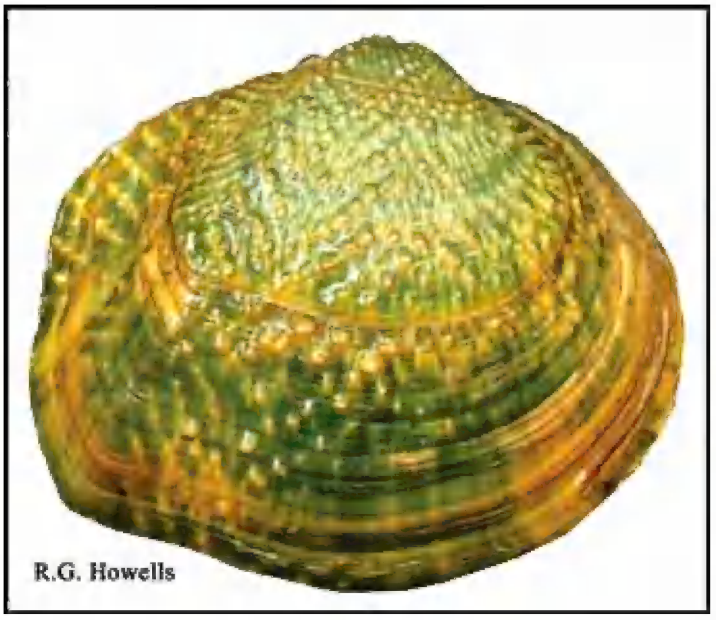

Figure 5. Southern Mapleleaf (*Quadrula apiculata*) is one of the most abundant and widely distributed freshwater mussels in Texas, occurring in all major drainages statewide. In spite of this, 43% of the people tested falsely identified it as Wartyback, Texas Pimpleback, Smooth Pimpleback, Pimpleback, Western Pimpleback, Threehorn Wartyback, *Q. pustulosa*, or *Q. nodulata*. This mistake appears to reflect common and scientific names that allude to pimples, pustules, or nodules because most Southern Mapleleaf specimens are abundantly sculptured with small pimples.

Table 1. Current study and previous freshwater mussel identification accuracy testing.

	Shea et al. (2011)	Current Study (2013)
Specimens selected by	4 experts	3 experts
Expert experience total	50 years	37.5 years
Number of test specimens	74	52
Number of test species	27	36
Subjects (people) tested	18	51
Possible correct identifications	1332	2652
Drainages	One: Apalachicola-Chattahoochee-Flint-	Statewide: Red, Sabine, Neches-Angelina, Trinity, San Jacinto, Buffalo Bayou, Brazos, Colorado, Guadalupe-San Antonio, Nueces-Frio, Rio Grande

Table 2. General freshwater mussel identification accuracy among all individuals combined, by employment affiliation, and educational level for testing in Texas in 2013. *Among advanced degree levels, there was one 98% correct score in each group; results are presented both with and without these outliers.

General Identification Accuracy
All Individuals Combined

	Correct	Wrong	Unidentified
N identifications	627	766	1259
Correct (%)	23.6	28.9	47.5

Mean Percent Correct Identifications
by Employment Affiliations*

University	State	Federal	Private Consultant	Other
91.0	25.1	28.8	12.4	0.0-26.9

** Excludes one test subject due to mixed affiliations over time

Correct Identifications by Educational Background
(Number of individuals; Mean and Range Percent Correct)

Diploma/Degree	High School	BS/BA	MS/MA	Ph.D.	Total
N individuals	1	16	26	8	51
Correct Identifications	4%	20.3%	26.6%	18.9%	
(% Mean-Range)	(4%)	(0-98%)	(0-98%)	(0-98%)	
Correct Identifications Minus 98% Scores (Mean-Range)	4% (4%)	15.1% (0-77%)	23.7% (0-78%)	7.6% (0-37%)	

Table 3. Identification accuracy (identifications correct, wrong, and unidentified) of common, non-listed freshwater mussels and those listed by Texas Parks and Wildlife Department as legally-threatened species including group averages and individual species examples based on testing conducted in Texas in 2013.

Group Averages

	Non-listed Unionids			TPWD-Threatened Unionids		
	Correct	Wrong	Unidentified	Correct	Wrong	Unidentified
N responses	409	527	798	170	227	419
Mean %	23.6	30.4	46.0	20.8	27.8	51.3
Total *N* responses		1734			816	
N species		22			12	

Examples of Common, Wide-spread Species (Non-listed)

Species	*N* Specimens	*N* Responses	% Correct	% Wrong	% Unidentified
Threeridge *Amblema plicata*	2	102	34.3	28.4	37.3
Washboard *Megalonaias nervosa*	2	102	30.4	23.5	46.1
Giant Floater *Pyganodon grandis*	1	51	7.8	39.2	52.9
Yellow Sandshell *Lampsilis teres*	1	51	29.4	23.5	47.1
Southern Mapleleaf *Quadrula apiculata*	2	102	32.4	27.5	40.2

Examples of Legally-threatened Species (Listed)

Species	*N* Specimens	*N* Responses	% Correct	% Wrong	% Unidentified
Texas Fatmucket *Lampsilis bracteata*	1	51	19.6	25.5	54.9
False Spike *Fusconaia mitchelli*	2	102	18.6	20.6	60.8
Golden Orb *Quadrula aurea*	2	102	31.4	23.5	45.1
Smooth Pimpleback *Quadrula houstonensis*	1	51	17.6	35.3	47.1
Texas Pimpleback *Quadrula petrina*	2	102	18.6	23.5	57.8
Texas Fawnsfoot *Truncilla macrodon*	2	102	23.6	28.9	47.5

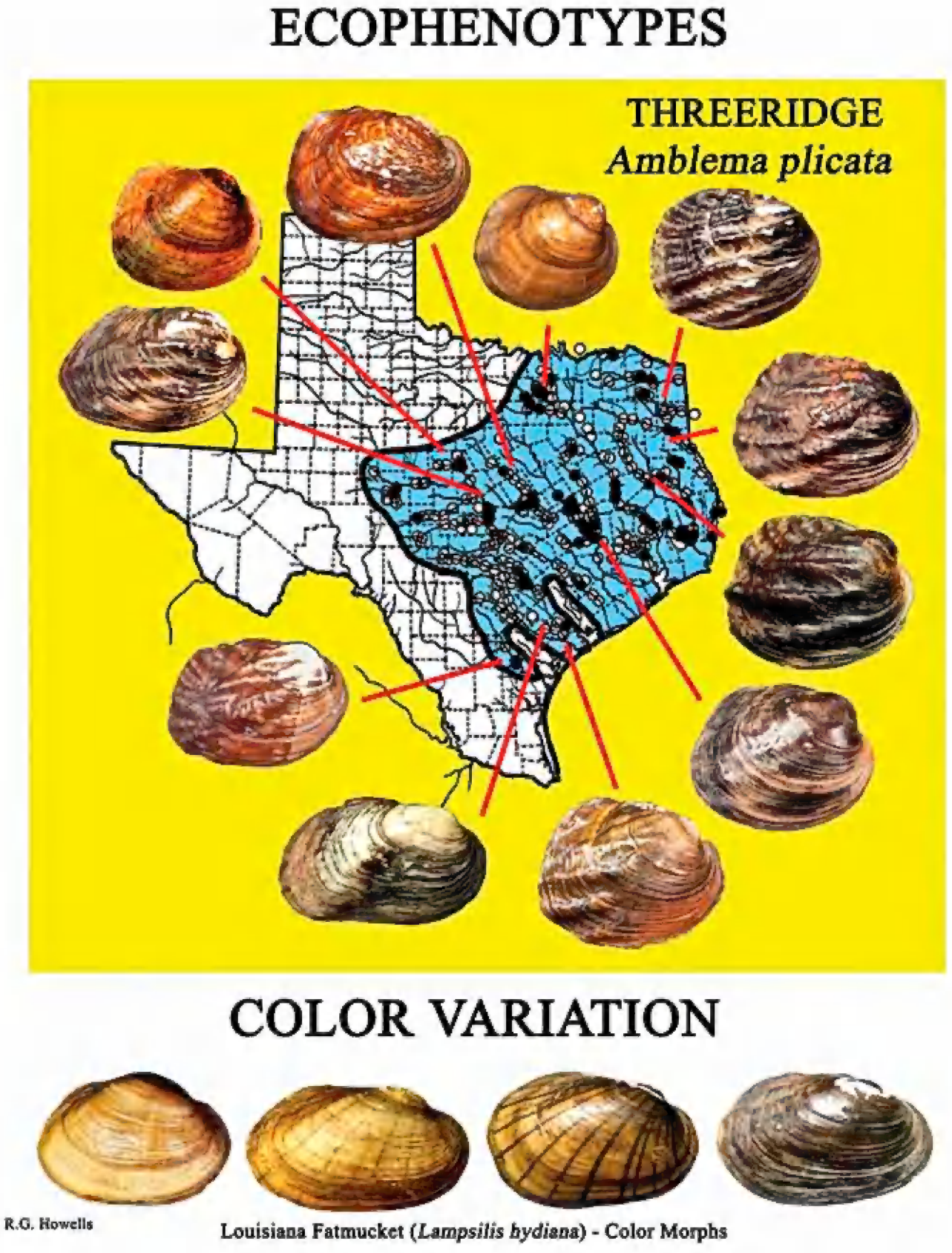

Figure 6. The presence of sculpture and distinctive coloration was found to increase identification accuracy in an earlier study in the Southeastern U.S. Neither trait appeared particularly significant in a similar study in Texas in 2013. Extensive physical variability associated with ecophenotypes (different forms in different environments), age, and sex, and extensive range in color morphs of some unionids, may reduce the value of sculpture and coloration as a diagnostic tool in Texas.

Just What the Doctor Ordered

Lisa Fitzgerald

I don't think I've ever had to justify shelling as a hobby to anyone. Try to explain the allure, perhaps, but justify – no. If for some reason I did need justification, I know where there is plenty of solid evidence that shelling is just what the doctor ordered!

When I can't be at the beach, or working on my shells, I often find myself drawn to used bookstores. Over the years I've managed to amass a decent collection of old shell books and guides. The mid-twentieth century saw a surge in the publication of books about shelling. Not just guide books for identifying shells, but books that actually explained shelling as a hobby.

One of my favorite lines is from a 1956 publication, *Shells, 400 in Color and Black and White, Shelling*, text by Mani O'Mara, (M. W Publishing Co., Tice, FL). The introduction states, "Doctors recommend shell-gathering as a hobby for many tense personalities, who find that the long days of sun and air, the relaxation of pouring over their finds at night, induce deep slumber and soothed nerves." Ah. Truer words were never spoken.

Let's Go Shelling, by Frances Peabody McKay (Great Outdoors Publishing, St. Petersburg, FL) was published in 1968. Mrs. Peabody states: "Here are some of shelling's qualifications as a hobby: it is both an outdoor and an indoor sport, it appeals to the very active person and to the student, wives and husbands can do it together and there is no limit to its areas of interest. Furthermore, shelling is just as beneficial in taking off those extra pounds as floor gymnastics, and a lot more fun. On the beach there is a breeze blowing and the lungs fill with fresh air, or maybe it is necessary to walk a good distance to where the shells are and this calls for a brisk gait to get there before the tide washes the shells back. Stooping over to pick up shells is a perfect waist slimming exercise, for in a shelling expedition a collector will double and even triple the number of times recommended by a therapist. No matter how tired he is a person will always bend for the next bright shell, as it just might be that rare one. And while concentrating on shells the gatherer always goes farther than he realizes and has to walk back the same distance, this time carrying heavy buckets of shells." I knew there was a reason I didn't have to go to the gym!

Romance of Sea Shells was written in 1952 by Egbert T. Smith. In his small, yet elegant pamphlet, Mr. Smith writes, "No hobby excels shell collecting from a therapeutic standpoint, or brings us into closer communion with nature."

Getting Acquainted with Shells was published in Bulletin No. 10 of The Museum of Natural History, Springfield, MA, and was written in 1956 by Earl Hudson Reed. In the journal, Mr. Reed writes, "Shell collecting is also pre-eminent among those hobbies which have a definite therapeutic value. As a means of relaxation and of counteracting the nervous tension induced by our complex way of life, it is almost ideal." I wonder what Mr. Reed would think of today's "complex way of life!"

S. Peter Dance, in his 1972 book, *Shells and Shell Collecting*, (Hamlyn Publishing, London) writes: "It should be recognized, nevertheless, that shell collecting may have a very useful part to play in modern society as an occupation with considerable therapeutic qualities. Ever since Laelius and Sipio took up shell collecting as a means of relaxation it has given pleasure and peace to those who are troubled, tired or frustrated."

So there you have it. While I didn't expect you to learn anything new in the excerpts from these great old publications, I did know you'd appreciate their sentiments. At least now, the next time someone questions your passion for shelling, you can resolutely tell them, "It's just what the doctor ordered."

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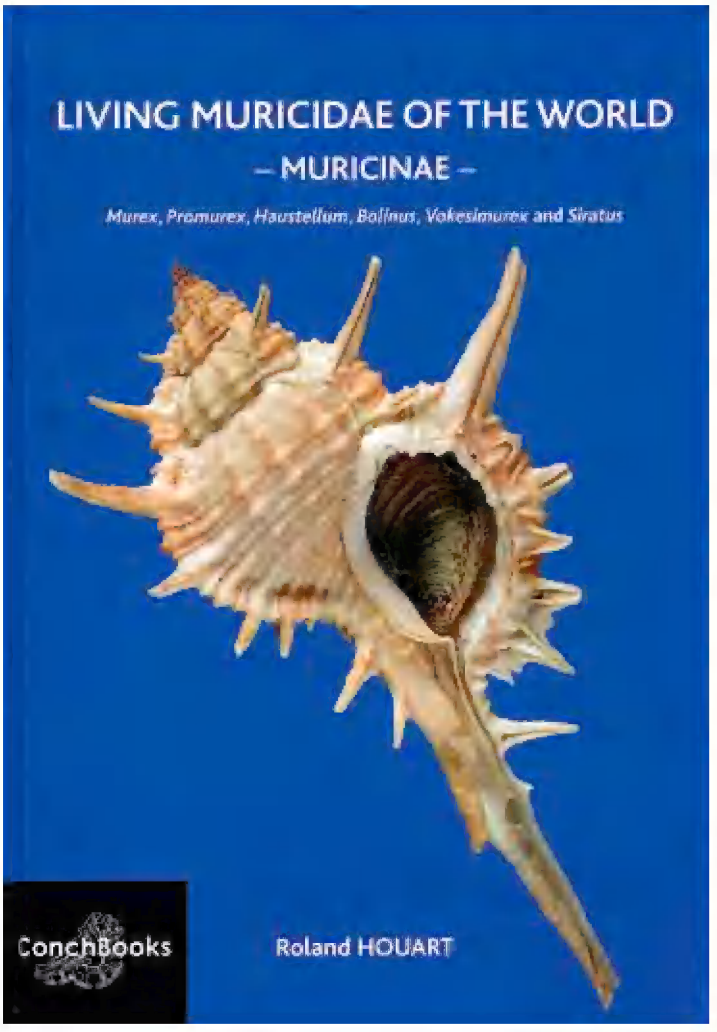
Living Muricidae of the World: Muricinae

Murex, Promurex, Haustellum, Bolinus, Vokesimurex and Siratus

by Roland Houart



ISBN (hard cover) 978-3-93 9767-59-6; published in 2014 by ConchBooks, Harxheim, Germany, 8.5 x 11 in, 197 pages, lavishly illustrated with full color plates displaying multiple specimens of each species, magnified images of key morphological features, and complete descriptive text. Cost approx. $115, avail from MDM Shell Books (mdmshellbooks.com) and Conchbooks (conchbooks.de).

First, I apologize to our readers and to Roland Houart for not publishing this review before now. Until I started working with Emily Vokes on the images for her article in this issue, I was blissfully ignorant of the poor taxonomic condition of my muricid collection. I was saved for purposes of illustrating the article because Jose and Marcus Coltro of Femorale (Femorale.com) are always more than generous with their shell images - and unlike me, their taxonomy was up-to-date (thanks guys). I knew I needed the most recent and most thorough study, and luckily in the Emily Vokes article was, "Houart (2014) (the definitive study to date)..." (Vokes, page 8 in this issue). That was certainly good enough for me and I bought the book at the 2017 Key West COA convention.

"Definitive" is certainly the correct term for the Roland Houart book. In under 200 pages he has put together several features that I believe mark the best of what is available in conchological literature. First, this is not just a picture book. There is actual text describing each shell in detail (critical when trying to separate two look-a-like species) with type information, synonymy, distribution, **description**, and remarks. When I am looking up one of my shells, I want the story behind the shell - Roland Houart provides this. The next "best" feature is the manner in which he illustrates the shells. The second half of the book is full of full page high quality color plates showing multiple specimens of each species and magnified views of key morphological features. You are almost certain to be able to match your shell in hand, rather than settle for, "...it's kind of like..." The book also has a complete bibliography and index, as well as the interesting feature that all species identified after 1971 are in bold (Vokes, 1971, Catalogue of the genus *Murex* Linnaeus, *Bulletins of American Paleontology* 61(268): 1-141, is considered the standard reference to that date).

A lot has happened in the last decade or so to improve the tools available for research and for increasing our knowledge of the natural world. What we "know" today will surely undergo changes in the future. This is an age-old process that has certainly sped up recent years. We know there will be changes, and indeed Roland Houart acknowledges this in his book, but for this point in time, if you collect or are interested in any of the some 1,500+ Muricidae, this book is a must have book. Unfortunately, we must wait for similar volumes on the remaining 10 subfamilies in Muricidae. Until then, for the Muricinae, this is the best $100 you can spend.

Tom Eichhorst

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Conchologists of America Convention
August 29th - September 2nd

2017 COA Key West Convention

Tom Eichhorst

Two days home from the 2017 COA Key West convention, and I decided I ought to get some of my thoughts written down as my memory is certainly not improving. Lots of people deserve credit for what was truly a memorable event. I will mention those responsible as I recall events. I apologize now for anyone I may miss. It was a COA convention that will long be remembered.

First, getting to Key West is not always a simple affair. I flew from Albuquerque, New Mexico, and my total travel time was quite a bit faster than those who drove from mainland Florida. On the other hand, I sat in truly uncomfortable seats, suffered a small 8-month-old tossing her cookies on my leg, and rode through some of the worse landings ever. I say that based upon 25 years in the US Air Force and 10,000 hours flight time. Worse landings ever.

The hotel was the Grand Key Resort, a Hilton Doubletree, and while not as large and fancy as some, it certainly was suitable, and the staff was competent and quite gracious. Key West has one resident COA member - our wonderful host, Greg Curry Sr. Obviously he needed help to host such an event, and help he got. The North Carolina Shell Club came down *en masse* to take over the myriad of tasks involved in running a successful convention. Other than the fact that they performed their various duties for free, you would not be amiss in calling the North Carolina folks professional conventioneers. They know how to run the show. There was also much needed help from Florida's Broward Shell Club and others.

The first official day of the convention was Tuesday, August 15th, but the three previous days were filled with pre-convention activities, including snorkeling trips, a Conch Train Key West Tour, a Ghost & Gravestone Tour, a Three Key West Attractions Tour, and a dinner cruise. Everett Long (North Carolina) was the selected herder of cats for the excursions. He was apparently successful as the same number returned as left. I did not get there until Monday evening, so I missed out on all of these, although I did hear the dinner cruise had great food but was a bit crowded and it was hot. That last is certainly surprising. Who would have thought Key West would be hot in August!

So, Tuesday morning and it was time for the COA Board meeting, scheduled from 8:00 to 10:00 am. While that meant we missed the first silent auction, it also meant we got to participate in a well-run meeting with a tight two hour agenda. Thank you Dr. Harry Lee - well done. We covered all required business and finished on time and I had time to register. Registration was a breeze, set up by Karlynn Morgan (North Carolina).

The opening session of the convention started on time at 10:30 am and the first speaker was Wolfgang Grulke, with truly stunning photographs of various *Nautilus* and relatives. Backing up a bit though, to get into the briefing room you had to pass by the convention raffle items and various shell club tables with COA t-shirts (Jeanette Tysor), COA pins (Vicky Wall), shells from the late Donald Bosch's collection (all from Oman), raffle tickets (Jan Reaves), and several tables of various miscellaneous shells from Florida and the Caribbean. These last were sold by Bob Pace, and all proceeds went to COA. Thank you, Bob.

Once in the main room we were greeted by Key West resident Greg Curry and his North Carolinian co-chair and the convention master-of-ceremonies, Ed Shuller. As Greg said of Ed when he would call him in a panic over some vexing convention issue, "It is impossible to listen to Ed for more than a few words without becoming completely relaxed. His calm easy-going manner just drops troubles away." To coordinate, schedule, and oversee the programs, we had Carole Marshall from Florida. Carole set up the programs, including contacting people many months prior and asking if they would like to give a program and then coordinating the various topics to ensure we had an eclectic schedule of programs so interesting that people wanted to attend each and every session. Carole also kept Ed and each

Key West COA Convention 2017 host, Greg Curry Sr. (standing), introduces the banquet speaker, Richard Goldberg. Photo by John Jacobs.

Bob Pace with tables crowded with tubs of Caribbean and Florida shells for sale, the proceeds of which all went to COA. Photo by John Jacobs.

Key West 2017 COA Convention master-of-ceremonies, Ed Shuller. Ed's easy going and calm demeanor seem perfectly suited for his MC role. Photo by John Jacobs.

Our first speaker, Wolfgang Grulke, autographing copies of his books, *Heteromorph* (2014) and *Nautilus* (2016). Photo courtesy of John Jacobs.

Jan Reaves from North Carolina, selling raffle tickets for quite a few popular shell items. Photo by John Jacobs.

Spondylus americanus at the silent auction during the welcome party. This size and quality would later be seen at the bourse for $100 to $500. Photo by John Jacobs.

Silent auction bidding was quite active, setting a new record for COA earnings at such events. Photo by John Jacobs.

Cheryl and John Jacobs worked tirelessly setting up the silent auctions: selecting, packaging, and labeling over a thousand shells. Photo by Bev Dolezal.

Above: There was plenty of good food at the welcome party. Here Doug Wolfe demonstrates the carnivore plate while Cheryl Jacobs has a slightly more balanced approach. Photo by John Jacobs.

Seats start filling for the oral auction of shells from the Fredric Weiss collection. The total for the evening was $81,860! Photo by John Jacobs.

Below: The oral auction in progress. Photo by Bev Dolezal.

COA veteran auctioneers, Hank Chaney (left) and Paul Callomon (right). Photo by John Jacobs.

Donald Dan was presented a plaque for "Outstanding Service to COA" for his tireless efforts to obtain the Weiss collection as well as sort, box, and store it until it could be auctioned by COA. Photo by John Jacobs.

Larry Strange was presented a plaque for "Outstanding Service to COA" because he volunteered his services to professionally catalog and appraise thousands of shells for the Weiss family. Photo by John Jacobs.

speaker to a strict time schedule. While never physically removing a speaker, she was prepared and it looked close a couple of times. Always on hand for each presentation was Tom Ball (Florida) who set up each Power Point presentation and cleared the electronic glitches when the wrong button was pushed on the remote and the screen went blank.

Tuesday afternoon we had more great presentations and a chance at the second silent auction. There had been quite a lot of talk about the auctions this year because Key West was to feature shells donated from the Fredric Weiss collection. Photographs by John Timmerman (North Carolina) of the specimen shells slated for the oral auction had been teasingly sent out as email attachments and caused a bit of a stir. These same quality shells also filled every silent auction except the first one. So we crowded in to partake of the second silent auction on Tuesday afternoon. The shells were stunning, and each was well presented with a printed bidding sheet with bidding increments already filled in so you just had to fill in your registration number. John and Cheryl Jacobs (Florida) had spent untold hours sorting, boxing, preparing labels, and transporting the silent auction shells. It was a wonderful display, and the silent auctions brought in more money for COA than we usually get from the oral auction. There were five regular silent auctions, plus a sixth the night of the welcome party (organized by Dora Zimmerman).

The welcome party was Tuesday night with seating both inside the hotel and on the back patio (where the bar was). The food was good and plentiful, the auction shells great, and the company could not have been better. Lots of shellers and alcohol - always a great combination.

The next day (Wednesday) we had more interesting programs (I found the talk on nerites particularly fascinating) and the third and forth silent auctions (not counting the one held during the welcome party). These auctions maintained the standards for high quality specimen shells and active, if not a bit frenzied, bidding. All of this paled in comparison to the evening's event, the oral auction.

Most attendees had already seen the shells from the Weiss collection online or certainly in the full color brochure with John Timmerman's photos. Seeing them in person, however, was another matter. These were nicely-sized high quality shells and the evening promised to be exciting. Our auctioneers were two well-seasoned (some might say old) pros, who knew how to work their audience. Paul Callomon (Pennsylvania) and Hank Chaney (California) played to a packed room and they played their audience expertly. By the end of the evening a new record had been set for the COA oral auction - 119 lots had been auctioned for approximately $81,860! In total the various auctions brought in more than $110,000 for the 2017 COA convention. There are two things to note here. First, shells from the Weiss collection will also be auctioned off at the 2018 San Diego convention as well as the 2019 Sanibel convention. Second, this is all because of the hard work and dedication of long time COA member Donald Dan. He procured this collection for COA and then spent hundreds of hours boxing, moving, and storing the collection. Also of note is the volunteer help of Larry Strange who examined the thousands of shells and provided a formal appraisal for the Weiss family.

You might think there would be a bit of a letdown after the activities of Wednesday night, but no, Thursday had another silent auction packed full of great looking shells and several superb speakers with shell related presentations. The last presentation was by Ron Bopp on "Shells and Trading Cards." This topic was new to most of us and

Bill Lyons (left) and Hugh Morrison (right) watching "Dora's Adventures" or possibly looking up shell data. The lovely Simone Pfuetzner is in the background. Photo by John Jacobs.

A small portion of the gorgeous shell display typically set up, as if by magic, by Sue Hobbs. Although space was limited, this year's bourse was still a special event enjoyed by all. Photo by John Jacobs.

Anne Joffe, when not traveling across the country setting up and promoting COA conventions, had time to write a book (see last issue for review). Photo by John Jacobs.

A few of the thousands of bourse shells on display. Photo by Bev Dolezal.

Bob Janowsky says a few words after accepting his *Neptunea* Award. As one of eight original COA founding members, Bob has been a steady and consistent supporter of COA. Photo by John Jacobs.

Five of the eight founding members of COA at the intial 1972 Rhode Island meeting. Left to right: Dorothy Janowsky, Kirk Anders, Bob Janowsky, Bette Rachlin, and John Parduano. Not shown are Mavis Walkup, Carl Erikson, and Mrs. Robert Armstrong. Photo anon.

his was an entertaining end to what had proven to be an interesting slate of speakers with a wide variety of topics. After Ron's talk was the annual COA business meeting. President Harry Lee had each board member introduce him or herself, after which were various activity reports. These included the establishment of a nominating committee for next year's COA officer elections (Dave Green, Chair; Tom Grace, and Rick Edwards), the COA financial report, and the academic grants provided by COA in 2017 ($25,652 to 10 recipients). The business meeting ended and we were presented with a tag-team briefing by David Waller and David Berschauer on the 2018 COA convention in San Diego - 29 August to 2 September 2018. They talked about the Sheraton Hotel (easily accessed across the street from the airport) with convention rates of $189 single and double (plus all of the sundry taxes hotels now typically charge) and walked us through the many local attractions. It looks to be a spectacular event. The two Davids ended the day's presentations and we were left to prepare for the evening's annual banquet.

Hazel Andress was in charge of banquet, which this year was buffet style. There was plenty of great food, enough for seconds for those who did not get enough conch fritters the first go-around. After dinner we were served up a presentation by Rich Goldberg of the last COA convention in Key West in 1980. Unlike that year, we had no hurricane to contend with this time around - the weather was perfect. Rich shared a treasure trove of images from the 1980 convention and most amazingly, he knew most of the people in the photographs. There were images of young folks who are still with us, with a few added years, and images folks no longer with us, but fondly remembered. It was a well-done but bitter-sweet presentation. Next Everett Long took the podium (no need for a microphone) to announce the winner of this year's *Neptunea* Award. As he talked about the winner being the only active COA member of the original eight members who started the organization in 1972, it was quickly obvious he was talking about Robert (Bob) Janowsky. Bob is indeed a founding member. Congratulations Bob; it is a well-deserved recognition.

After the *Neptunea* Award, it was all over except the shell club reps' breakfast and the COA bourse (first held in 1978) the next two days (Friday and Saturday). The club reps' breakfast was hosted by José Leal in absence of Vice-President Wayne Humbird who was unable to attend the convention. Lots of issues were discussed and Phyllis Gray promised to send out the minutes to all of the meeting attendees. Then it was time for lunch and the bourse.

There was apparently still some money left after the various auctions as I witnessed plenty of folks with full shell trays preparing to take home their bourse treasures. Lynn Gaulin (Florida) set up the bourse and with some with some fancy "footwork" managed to fit the dealers into a less than optimal space. There were 30 shell dealers this year and, due to room size constraints, they were spread between two rooms and in a hallway. It seemed to work as they all appeared to have plenty of active customers.

And that was the 2017 COA Key West convention – successful beyond our wildest dreams and a vivid indication that ours is a vibrant organization with active and dedicated members. I hope to see you in San Diego next year (29 August to 2 September 2018).

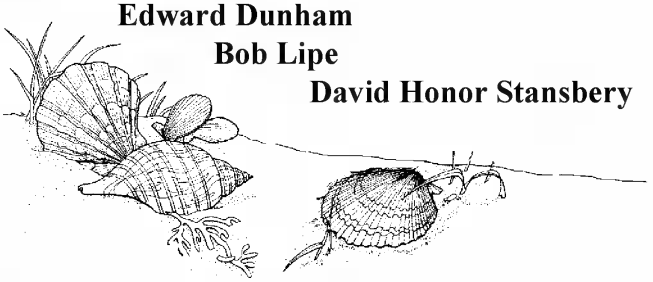
COA Conventions (1972-2020)

1972 – Newport, Rhode Island
1973 – Bahamas
1974 – Seattle, Washington
1975 – Virginia Beach, Virginia
1976 – Portland, Oregon
1977 – Fort Lauderdale, Florida
1978 – Long Island, New York
1979 – Santa Monica, California
1980 – Key West, Florida
1981 – San Francisco, California
1982 – Sanibel Island, Florida
1983 – Sarasota, Florida
1984 – St. Petersburg, Florida
1985 – Philadelphia, Pennsylvania
1986 – Fort Lauderdale, Florida
1987 – St. Louis, Missouri
1988 – Fort Myers, Florida
1989 – San Diego, California
1990 – Melbourne, Florida
1991 – Long Island, New York
1992 – Jacksonville, Florida
1993 – Panama City, Florida
1994 – Corpus Christi, Texas
1995 – San Diego, California
1996 – St. Petersburg, Florida
1997 – Captiva Island, Florida
1998 – Orlando, Florida
1999 – Louisville, Kentucky
2000 – Houston, Texas
2001 – Port Canaveral, Florida
2002 – Sarasota, Florida
2003 – Tacoma, Washington
2004 – Tampa, Florida
2005 – Punta Rassa, Florida
2006 – Mobile, Alabama
2007 – Portland, Oregon
2008 – San Antonio, Texas
2009 – Clearwater, Florida
2010 – Boston, Massachusetts
2011 – Cape Canaveral, Florida
2012 – Philadelphia, Pennsylvania
2013 – Sarasota, Florida
2014 – Wilmington, North Carolina
2015 – Weston, Florida
2016 – Chicago, Illinois
2017 – Key West, Florida
2018 – San Diego, California*
2019 – Sanibel, Florida*
2020 – Cape Canaveral, Florida*

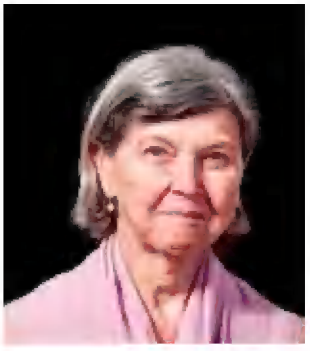
* Planned

In Memoriam:

Ruthie Abramson
Edward Dunham
Bob Lipe
David Honor Stansbery



Ruth (Ruthie) Frances Abramson, 82 (9 May 1935 - 2 July 2017), of Jacksonville, FL, was born to Emma and Lynn Henshaw in North Miami. Ruth attended Miami Edison High school, then received a teaching degree from Florida State University and a Master's Degree from the University of Florida. After teaching High School American History on local Channel 7, Ruth taught at Fletcher High School and Sandalwood High School where she was the Department Head. She was a dynamic and creative teacher who inspired enthusiasm in her students. For many years Ruth served the community through her involvement with the Jacksonville Shell Club and the Greater Jacksonville Coin Club. Ruth's greatest gifts were her endless creativity, her unrelenting graciousness and her ability to light up any room she entered. Ruth is survived by her beloved husband of forty years, Frank Abramson. They loved traveling the country with each other, exploring new things and meeting interesting people. You may remember them from the many shell shows where they were dealers with shell stamps, coins, and other interesting items. She will be missed by all who met her.



1992 one rupee coin from the Seychelles.

Edward Dunham (1939 - 14 May 2017), of Florida, (here with wife Bettye) was a true scientist as a meteorologist for the Air Force and NASA for many decades. He applied the same scientific rigor to malacology. Ed could convey information to the general public on both subjects in a clear, convincing, and easily understood way. This was sometimes critically important in his chosen profession, but also important to us was his long history of communicating the importance and desirability of shells to general audiences. He majored in meteorology at the University of Hawaii and retired as a Senior Master Sergeant after 25 years of service in the U.S. Air Force, where he was the Chief Programmer for the Automated Weather Network for the Air Weather Service. Ed then worked for Raytheon in Massachusetts, where he was the senior meteorologist on the design of the Doppler Radar System. Upon moving to Melbourne, Florida, he helped develop radar systems architecture for both Air Force and NASA for their spacecraft launch ranges as the Senior Meteorologist for Boeing.

Ed was a volunteer meteorologist for several Space Coast area coastal fire departments and provided training during hurricane season. His weather email notifications were eagerly anticipated and always seemed more accurate than other sources. In October of last year, Hurricane Matthew neared the Florida Spacecoast as a major hurricane. Ed's correct prediction of the storm staying farther offshore than other government and public media meteorologist forecasts was remarkable.

***Granuliterebra eddunhami* Terryn & Holford, 2008 (courtesy of www.conchology.be.**

As a student of malacology, Ed specialized in the Terebridae. His reference collection of that family was extensive and comprehensive. He corresponded with the major *Terebra* specialists for the past forty years. A species of *Terebra* from Vanuatu *Granuliterebra eddunhami* was named for him by Terryn and Holford in 2008. Dr. Harry Lee and Ed Dunham coauthored an important article in the Jacksonville Shell Club's *Shell-O-Gram* on the interesting aspect of a white form of a popular *Terebra* that had originally been described as a *Buccinum*. The named shell was described from the collection of the Empress Maria Teresa of Austria (mother of Marie Antoinette).

Ed made provisions for his collection to be donated to the Florida Museum of Natural History in Gainesville, Florida, where his *Terebra* collection and other shells will be available for malacological research.

He was a longtime member of the Astronaut Trail Shell Club (ATSC) where he worked diligently for many years on the club's scholarship raffle. By obtaining exceptional shells from dealers at the annual ATSC shell show, sufficient funds were generated for grants to Master's or Doctoral candidates in marine biology annually since 1989. Ed was honored by the ATSC with a Certificate of Apprecia-

tion in January for his lifetime of scientific work for malacology and for his work for the club and local education to others about shells. He was also one of the subset of shellers who in addition to mollusks enjoyed growing orchids.

Ed Dunham was laid to rest after a military honor guard service at the Cape Canaveral National Veterans Cemetery.

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[Lee, H.G. and E. Dunham], 2016b. Corrigendum. *Shell-O-Gram* 57(2): 3. March. http://www.jaxshells.org/pdfs/marapr16.pdf

Terrum Y & Holford M. (2008) The Terebridae of Vanuatu with a revision of the *'Granuliterebra'* Oyama 1951. *"Visaya"* Supplement:3: 1-96.

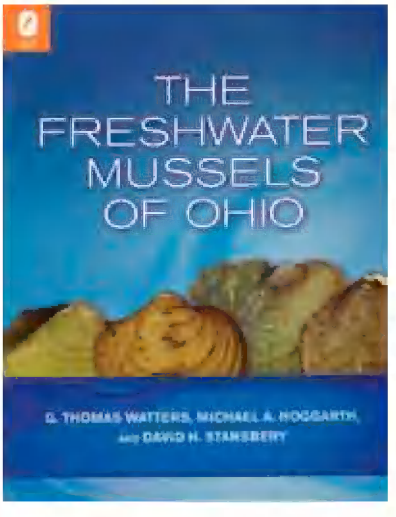
Robert (Bob) Lipe (1936 - 2017), of St. Petersburg, Florida (here with wife Betty, who we also lost this year) was a soft-spoken gracious man. He and Betty operated The Shell Store in St. Petersburg, and were the backbone of the St. Petersburg Shell Club for more than 50 years. It is truly the end of an era with his passing. It doesn't seem like enough to simply say that he will be missed. Bob and Betty supported the club and the shelling community for so long, it is difficult to believe they are gone.

Bob and Betty were a great team. They were members of the club since 1959 and never stopped working for the club. Bob loved all the ladies and he made every lady feel special. You knew you had "made it" when you got one of his famous neck rubs. He was always generous in his support of our shell show, donating his time to the layout and shells such as golden cowries for the raffle.

The marginellid *Canalispira lipei* is named for Bob Lipe.

Bob developed a passion for marginellids and in 1991 he literally wrote the book (Lipe, R. 1991. *Marginellas*. The Shell Store, St. Petersburg Beach, Florida. 40 pp.). About being a shell dealer, Bob wrote, "I was a collector, especially a *Marginella* collector long before I sold shells. The trip to West Africa in the 1970s was responsible for me becoming a shell "proprietor." I hate the word "dealer." Car dealer, drug dealer, etc. are looked upon distastefully. For some collectors, shell dealers are not your favorite people either. Just remember most of us are shell lovers too." (Conch-L, 3 June 2007) Both *Prunum lipei* (Clover, 1990), and *Canalispira lipei* E.F. García, 2007, are named after Bob. Both he and Betty were two of the nicest people you could ever meet in the shell world and both will be sorely missed.

David Honor Stansbery (1926 - 2017), of Columbus, Ohio, was born on May 5, 1926 in Upper Sandusky, Ohio, to Honor G. and Daisy E. (Kirby) Stansbery. David was a graduate of Upper Sandusky High School, served in the U.S. Navy from 1944-1946, and earned his Ph.D. at Ohio State University. He held the positions of Professor Emeritus at Ohio State University, Curator of the Ohio State Museum of Natural History, Educator, Author, Editor, Researcher, Ecologist, and Malacologist. David served on the National Board of The Nature Conservancy and as President of the American Malacological Union. He received numerous rewards and recognitions for his work to protect the environment and promote biological diversity.



Along with collegues, G. Thomas Watters and Michael A. Hoggarth, he published *The Freshwater Mussels of Ohio* in 2009. He was preceded in death by his parents and his wife Mary Lois Pease Stansbery. Survived by his brother, Daniel Keith (Gloria); children, Michael (JaNae), Mark (Debbie, deceased), Kathleen (Francis) Pang, and Linda (Bruce) Anschutz; eight grandchildren and several great grandchildren. Published in *The Columbus Dispatch* on Aug. 26, 2017.

Land snails of the rocks, trees, and leaves

Teresa Rose Osborne and Rebecca J. Rundell

In 2003, Rundell conducted her first field season in Belau, funded in part by Conchologists of America. Belau (Republic of Palau, Oceania) is an archipelago of ≥500 islands totaling 415km^2 in the Caroline Islands (Fig. 1). This small island system is home to as many as 200 native land snail species found in leaf litter, emergent vegetation, and limestone karst microhabitats (Rundell 2008). Belau land snails are also found on two dramatically different soil types, volcanic and limestone, since some of the largest Belau islands are volcanic in origin, but most of the archipelago was formed by limestone and coralline uplift.

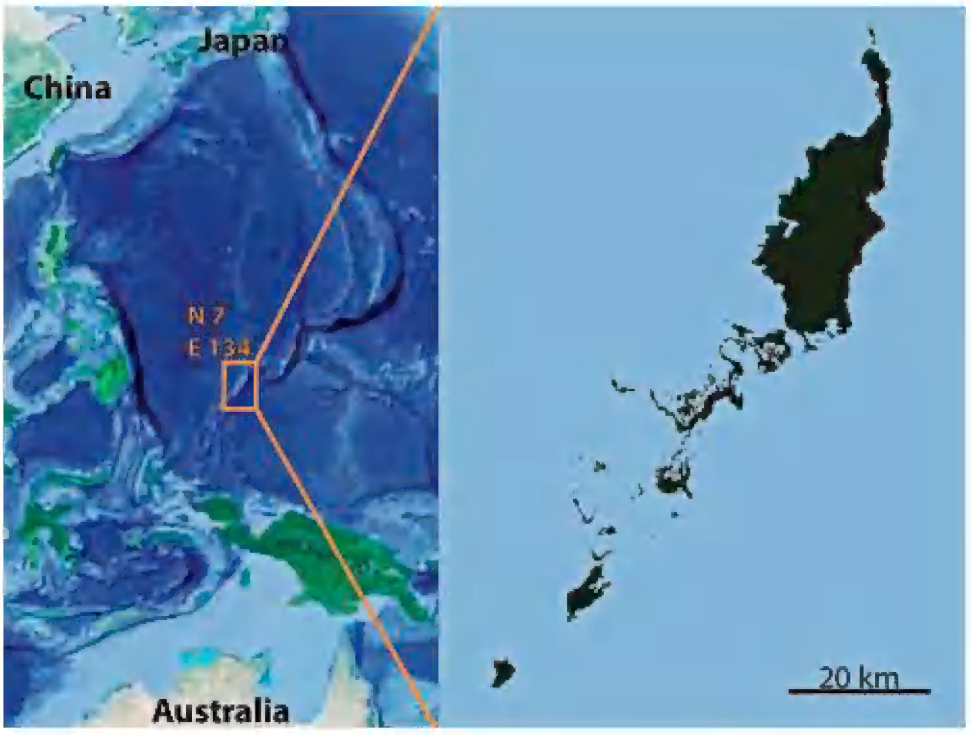


Fig. 1. Map of the Belau archipelago (Republic of Palau, Oceania), N 7°, E 134°. Map created by and reproduced with permission of J. Czekanski-Moir.

Rundell was particularly interested in the land snail family Diplommatinidae in Belau. Like most Belau land snails, diplommatinids are tiny micromollusks. All are less than 1 cm in shell height (Yamazaki *et al.* 2013, 2015a, b). Diplommatinidae is the most species-rich land snail family in Belau (Rundell 2008).

Rundell visited numerous islands in her search for diplommatinids in 2003, recording 63 sites in Belau and 9 in neighboring islands. She and her field assistants visually searched for snails in all three microhabitat types present and, at some sites, collected bags of leaf litter as well. In contrast to previous studies that stress the importance of litter collection for finding micromollusks (Durkan *et al.* 2013), all but one leaf litter-dwelling morphospecies were detected by visual searches. Perhaps, since searchers in Belau were looking almost exclusively for micromollusks, their eyes were better trained to find even the most diminutive snails. Rundell identified snails to morphospecies based on shell morphology (e.g. shell ribs and spines, color, shape, size), and several of these morphospecies were later supported by DNA sequences (Rundell 2008). In total, Rundell and her field assistants found 42 diplommatinid morphospecies in 2003, representing *Hungerfordia*, *Diplommatina*, and *Palaina* genera (Rundell 2008). Specimens were integrated into Field Museum of Natural History Invertebrate Collections and remain on long-term loan to Rundell.

Osborne recently decided to re-examine the 2003 collections to better understand Belau diplommatinid ecology. She used site codes to determine microhabitat type, island, soil type (based on island geology), and political state where snails were collected. She found that all diplommatinid morphospecies were recorded in leaf litter. Over half the morphospecies (25) were leaf litter specialists, and 9 were found in limestone karst and leaf litter (Fig. 2). We were surprised to find so many leaf litter specialists and no limestone karst specialists, since *Hungerfordia* are generally considered limestone specialists (Rundell 2008, Yamazaki *et al.* 2013, 15a, b). Numbers of leaf litter specialists may be inflated, since many snails were found in substrates consisting of leaf litter-limestone rubble mixtures. These were considered "leaf litter" microhabitats at the time. Snails found in mixed substrates may be more properly considered limestone karst specialists, particularly if they were also found in unambiguously limestone karst sites. Only two morphospecies were found in emergent vegetation and leaf litter, and six were found in all three microhabitat types.

We used three alpha diversity metrics calculated in the R package "vegan" (morphospecies richness, Shannon index, and Simpson's index) and use (combined live-dead specimen counts) to estimate the resource bases in different microhabitat and soil types. We reasoned that sites with larger resource bases would support greater alpha diversity and land snail use. We compared alpha diversity and use

Table 1. Significance of ecological and geographical variables in explaining Belau diplommatinid alpha diversity and use as tested using four-way ANOVA.

		p-value			
Explanatory variable	df	Morphospecies Richness	Shannon Index	Simpson's Index	Use
Political State	13	**<0.001**	**<0.001**	**0.003**	**0.017**
Soil Type	2	**0.010**	**0.018**	0.861	0.140
Microhabitat Type	2	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Soil Type: Island	9	0.059	0.087	0.298	0.258
Residual	122				

across microhabitat type, soil type, political state (as a proxy for geographic region), and island nested within soil type using ANOVA and Tukey's HSD in R. All three alpha diversity measurements and use varied by political state and microhabitat type (Table 1). Soil type explained variability in morphospecies richness and Shannon index but not Simpson's index or use, and no pairwise comparisons across soil types were significant. This could be because soil type data were missing for many sites. Variability explained by political state implies regional differences in alpha diversity and use that could be explored more thoroughly in future analyses.

Alpha diversity and use were significantly lower in emergent vegetation than in limestone karst or leaf litter (Fig. 3). Alpha diversity and use are highest in limestone karst, but alpha diversity differences between limestone karst and leaf litter were nonsignificant. Leaf litter had the greatest range in alpha diversity, with morphospecies richness ranging from zero to six, and limestone karst had the greatest range in diplommatinid use. These results are not surprising. High calcium availability in limestone karst is expected to support many individuals and many morphospecies. Emergent vegetation may provide less calcium and may have fewer humid resting places for snails to exploit, providing a limited resource base and supporting smaller populations and fewer morphospecies. Diplommatinids in emergent vegetation may also face competition from more specialized tree snails, however, Rundell and her field assistants generally spent less time visually searching emergent vegetation sites, since they perceived emergent vegetation searches as less fruitful. It is possible (though unlikely) that a few vegetation-dwelling diplommatinids were overlooked. Leaf litter may provide an intermediate microhabitat type in terms of resource base, with less available calcium than limestone karst but many humid resting places and more food sources from decay plant matter. Inclusion of litter-limestone rubble mixed microhabitats with leaf litter microhabitats may also obscure alpha diversity differences between litter- and limestone-based microhabitats.

We were also curious whether beta diversity varied across microhabitat or soil types. Beta diversity might give

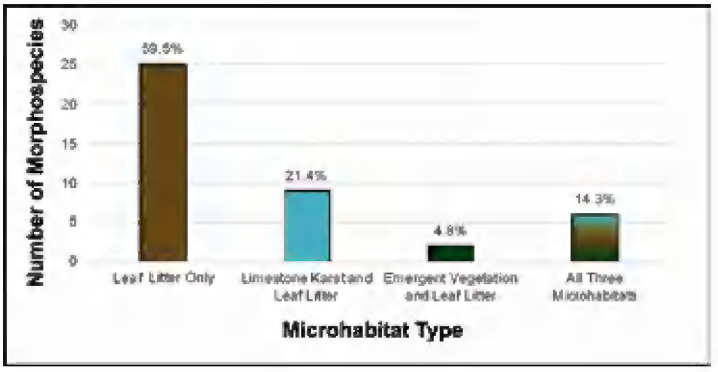


Fig. 2. Number of morphospecies found in each microhabitat type.

an indication of snails' dispersal abilities, since easily dispersing snails may become widespread and drive down beta diversity. We measured beta diversity using Sørensen Coefficient and ubiquity index, the proportion of sites occupied by each morphospecies. Sites in which no diplommatinids were found were excluded from analyses. Sørensen Coefficient measures average dissimilarity in morphospecies assemblage between sites that share common soil or microhabitat type and was calculated using the R package "vegan." Ubiquity index was calculated by dividing total morphospecies occurrences in each site of a given soil or microhabitat type by the total number of sites in that environmental category. Ubiquity index is inversely related to beta diversity, since it measures morphospecies composition similarity between sites. Using the program R, beta diversity in volcanic and limestone soils were compared with two-tailed t-tests, and microhabitat types were compared with ANOVA and Tukey's HSD.

Beta diversity was not significantly different between soil types ($p_{Sørensen} = 0.7488$, $p_{ubiquity} = 0.4902$) but was significantly different between microhabitat types ($p_{Sørensen} < 0.001$, $p_{ubiquity} < 0.001$). Beta diversity was lower in limestone karst than in leaf litter (Fig. 4). Emergent vegetation beta diversity grouped with limestone karst using Sørensen Coefficient but with leaf litter using ubiquity index. This is because the two measurements are calculated very differently. Sørensen Coefficient measures the number of shared

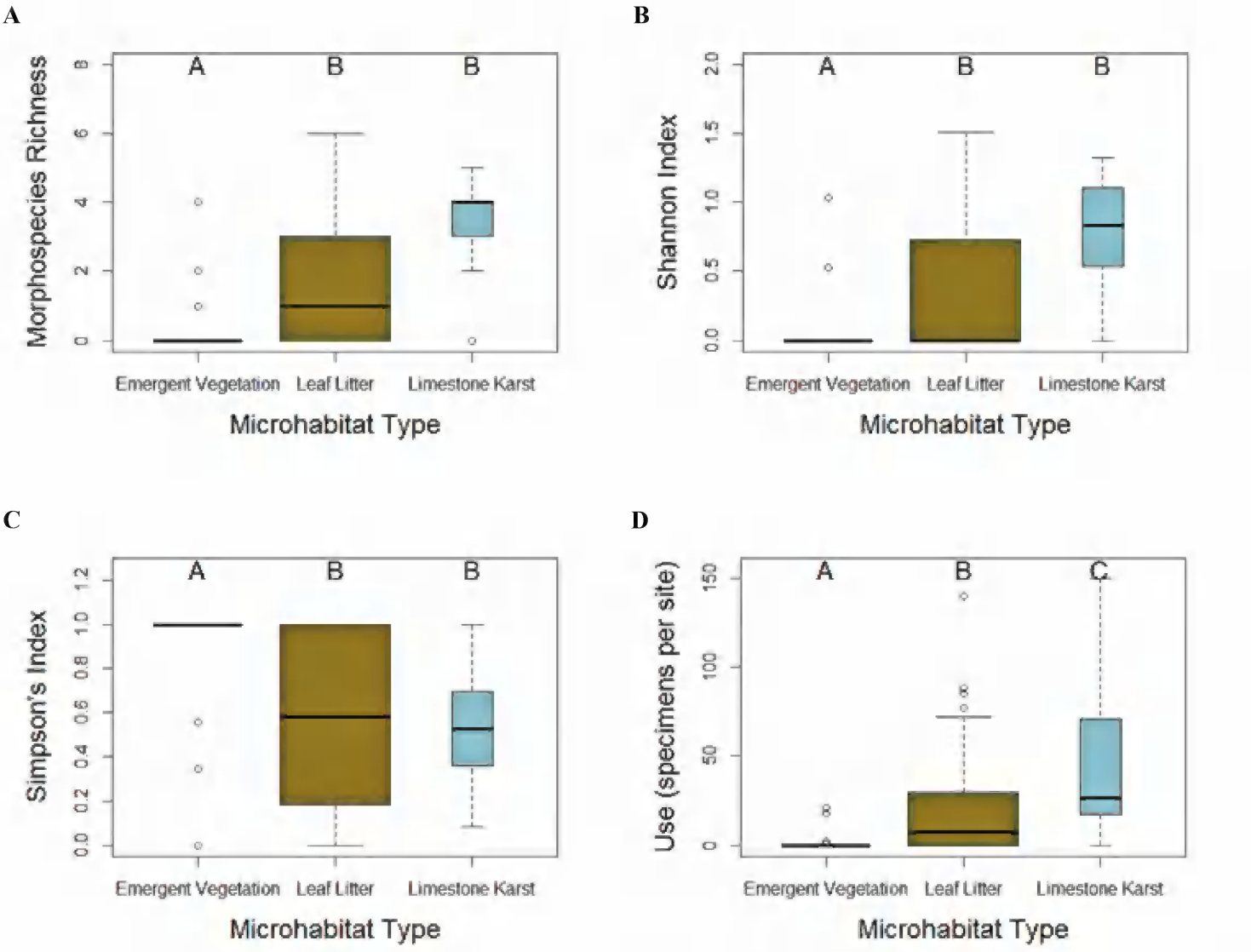


Fig. 3. Alpha diversity and use in different microhabitat types as measured by (A) morphospecies richness, (B) Shannon index, (C) Simpson's index (inversely related to alpha diversity), and (D) use (combined live-dead specimen counts). Microhabitats with the same letter are not significantly different from one another.

morphospecies between sites, while ubiquity index measures the proportions of sites a given morphospecies occupies. Since some emergent vegetation sites were occupied by only one morphospecies, there was relatively high morphospecies turnover between sites. Because there were only six emergent vegetation sites occupied by diplommatinids, even morphospecies found at only one site were relatively "ubiquitous." When unoccupied sites of all microhabitat types were included in analysis, emergent vegetation ubiquity grouped with leaf litter, not limestone karst.

Low limestone karst beta diversity suggests that karst-dwellers are more likely to disperse between limestone karst sites than snails in other microhabitat types are. Since limestone karst is a relatively unsheltered microhabitat type, wind may be the most common dispersal mechanism (Vagvolgyi 1975). Limestone karst snails may more frequently encounter birds as well, who might inadvertently disperse snails stuck to their feathers or that survive the avian digestive system (Wada *et al.* 2012). Prominent shell ornamentation of many limestone-dwelling *Hungerfordia* (Yamazaki *et al.* 2013, 2015a, b) may increase the probability of passive aerial dispersal, either by becoming entangled in features or acting as "wings" when a breeze blows across them. Snails in emergent vegetation may also encounter birds more frequently than do leaf litter-dwellers.

Body size often correlates with ecological variables, and we wondered if this were the case in Belau diplommatinids. For example, smaller animals tend to reach higher densities (Maurer and Marquet 2013), whereas larger animals tend to have larger geographic ranges linked to greater dispersal abilities (Roy *et al.* 2001, Lyons and Smith 2013). We compared maximum species shell heights and collection

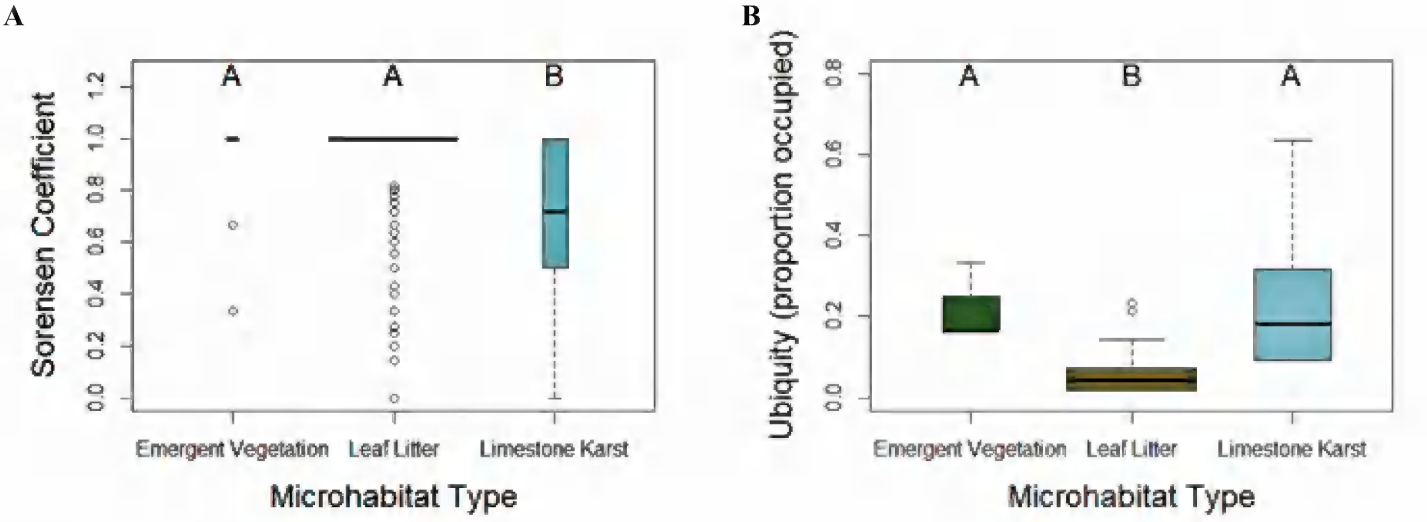


Fig. 4. Beta diversity in different microhabitat types as measured by (A) Sørensen Coefficient and (B) ubiquity index. Microhabitats with the same letter are not significantly different from one another.

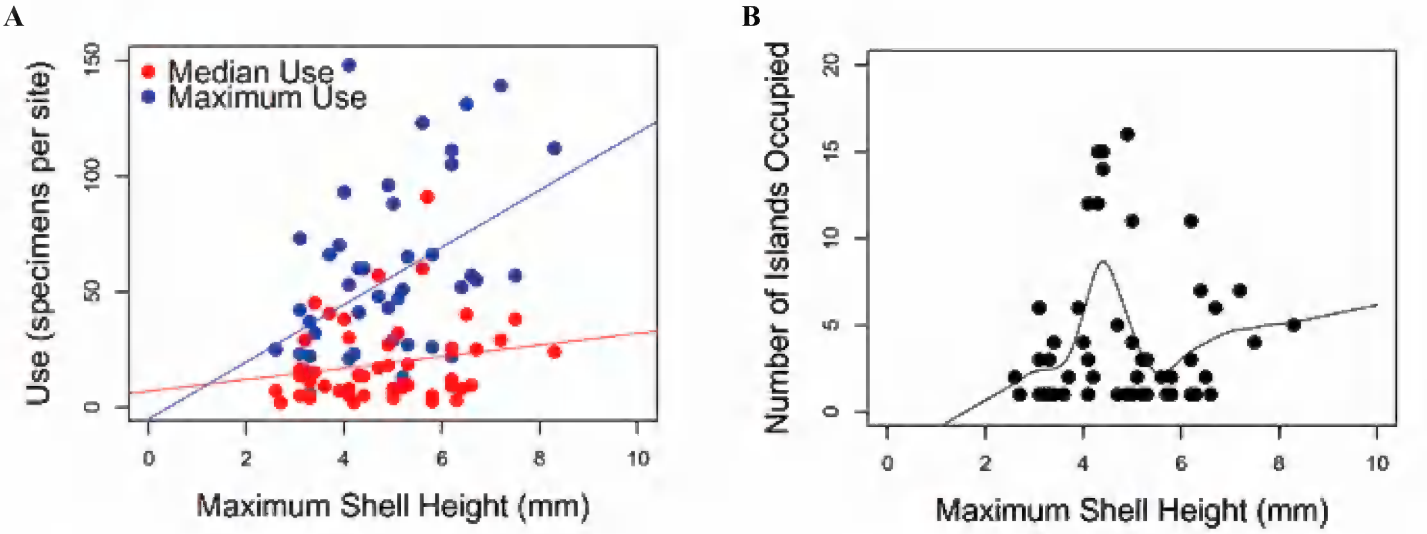


Fig. 5. (A) Correlation between maximum shell height and use (combined live-dead specimen counts) in *Hungerfordia*. Median use in red and maximum use in blue. Lines are best-fit linear regressions; R^2_{med} = 0.03819 (p_{med} = 0.165), R^2_{max} = 0.2065 (p_{max} < 0.001). (B) Hump-shaped relationship between maximum shell height and number of islands occupied in *Hungerfordia*. Line is best-fit LOESS regression; α = 0.35, df = 1, GCV = 16.14. Data from Yamazaki *et al.* (2013, 2015a, b).

data reported in recent taxonomic revisions of *Hungerfordia* published by Yamazaki *et al.* (2013, 2015a, b) and found that larger species reach higher densities (as measured by use) and mid-sized species have larger geographic ranges (found on a greater number of islands; Fig. 5).

Hungerfordia are typically found in limestone-rich microhabitats. These findings are in line with alpha diversity and use patterns observed in limestone karst sites in that they are likely the result of a greater resource base in karst. Limestone karst may support not only many morphospecies and individuals but also many individuals from large species. Larger species may have higher fecundity and/or resistance to stress and may thus have a competitive advantage. High beta diversity in limestone karst sites seems to be driven primarily by dispersal of mid-sized snails. Dispersal mode is unknown, and subject of much speculation. Mid-sized species may have higher aerial dispersal rates than smaller species if their larger shell projections increase the probability of attachment to birds (Fig. 6). They may be better dispersers than larger snails, because stronger winds are required to lift and carry larger snails (Vagvolgyi 1975). Our findings are in stark contrast to previous body size research, perhaps because the field has traditionally focused on large vertebrates like birds and mammals. Large vertebrates may have greater nutritional needs and therefore be more resource-limited than land snails, and their dispersal mechanisms are

Fig. 6. A Belau *Hungerfordia* sp. on a limestone rock showing the "prominent shell ornamentation" that may aide in dispersal by wind or feather entanglement.

very different from those of land snails. Perhaps more body size research should focus on small invertebrates like land snails to round out our understanding of body size ecology.

We concluded that diplommatinid specimens collected in 2003 included many leaf litter specialists with low morphospecies turnover between leaf litter sites, suggesting that high resource base and low dispersal rates led to high allopatric speciation. There were few morphospecies or individuals and high morphospecies turnover in emergent vegetation, possibly indicating a resource-poor, relatively exposed habitat, and/or competition from non-diplommatinid tree snails better adapted to emergent vegetation. Limestone karst morphospecies were diverse, widespread, and numerous, possible because of high calcium availability and high aerial dispersal rates between these sites. High calcium availability may support high population densities of large species in limestone, and aerial dispersal seems to favor mid-sized snails.

Compared to other diplommatinids, the Diplommatinidae of the Caroline Islands including Belau are particularly taxonomically diverse and morphologically divergent (Webster *et al.* 2012). High numbers of poorly dispersing leaf litter-dwellers may facilitate allopatric speciation. Microhabitat type specialization may in part drive morphological differentiation. Both leaf litter and limestone karst contained moderate to high alpha diversity and use, suggesting that both microhabitat types can accommodate high degrees of sympatry. Perhaps different ecological processes occurring in each microhabitat type facilitated Belau diplommatinids' remarkable diversification.

We wish to thank the Field Museum of Natural History Division of Invertebrates for their support of RJR's work and R. Ueshima, K. Yamazaki, and M. Yamazaki for their published data that enabled our analyses. We also thank J. Czekanski-Moir for inspiring body size analyses and providing a fine map of Belau, E. Clark for transcribing collection data, and RJR's many field assistants. Conchologists of American, The Lewis and Clark Fund for Exploration and Field Research, and the SUNY College of Environmental Science and Forestry Alumni Association fund TRO's work on Belau land snails.

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COA *Neptunea* Award

Many of us are beginning plans for the 2018 COA Convention in San Diego,CA. One of the many events on the agenda is the annual COA *Neptunea* Award(s), and it is my privilege at this time to call for nominations.

The consensus of the COA Board is to reopen nominations with a "clean slate" annually. **Nominees not selected in previous years are certainly welcome for consideration if re-nominated - in fact their re-nomination is encouraged.** For the present cycle, nominations will close on June 1, 2018, so as to allow ample time for deliberation before the convention. Please note that members of the COA Board of Directors are not eligible to receive the *Neptuna* Award while actively serving on the Board.

By way of background, the *Neptunea* Award (Brunner, 2000; Lipe, 2000) was established at the midyear (1999-2000) meeting of the COA Board in order to recognize outstanding and distinguished service to conchologists and malacologists in recognition of:

1. Service to the Conchologists of America.

AND/OR

2. Service to the scientific interests of Conchologists of America.

AND/OR

3. Service to the science of Malacology as it applies to conchologists anywhere. Although notable exceptions have been made, the COA Board, which serves as the jury for the *Neptunea* Award, has traditionally weighed its consideration for award recipients toward (1) amateurs: those not currently pursuing a principal career involving collection, study, or commerce of mollusks, (2) individuals "working behind the scenes" and relatively unrecognized in the COA world, for their contributions, and (3) active members of the COA. Up to three awards have been made at our annual conventions beginning with the Houston event in 2000 (see below). Nomination(s) for the *Neptunea* Award may be made by any COA member, and the format is simple:

Name of nominee:

This person deserves this award because (here a somewhat detailed paragraph will suffice.)

..... Signed .....

and either snailmail or email that nomination to the COA *Neptunea* Award Coordinator:

Everett Long
422 Shoreline Dr.
Cedar Point, N.C. 28584-7204
nlong3@earthlink.net

Previous *Neptunea* Award winners:
2000 (Houston, TX): Ross Gunderson, Ben and Josy Wiener, Debbie Wills
2001 (Port Canaveral, FL): Emilio Garcia, Harry Lee, Lynn Scheu
2002 (Sarasota, FL): Richard Petit, Bernard and Phyllis Pipher
2003 (Tacoma, WA) Jim and Linda Brunner, Kevin Lamprell, Doris Underwood
2004 (Tampa, FL): Bobbi Houchin
2005 (Punta Rassa, FL): Richard Forbush, Anne Joffe, William Lyons
2006 (Mobile, AL): Jack Lightbourn, Betty Lipe
2007 (Portland, OR): none given
2008 (San Antonio, TX): Bill Frank, Archie Jones
2009 (Clearwater, FL) none given
2010 (Boston, MA): none given
2011 (Port Canaveral, FL): Alan Gettleman
2012 (Cherry Hill, NJ): Gary Rosenberg, Martin Avery Snyder
2013 (Sarasota, FL): David and Lucille Green, Marlo Krisberg, Charles Rawlings
2014 (Wilmington, NC): Colin Redfern, Tom Rice
2015 (Weston, FL) John and Cheryl Jacobs, Kevan and Linda Sunderland
2016 (Chicago, IL) Rich Goldberg, Homer Rhode, Charlotte Thorpe
2017 (Key West, Fl) Robert (Bob) Janowsky

In advance I thank you for taking time to submit your nominee for consideration.
Everett Long
Award Coordinator

Brunner, L., 2000. The *Neptunea* Award. *American Conchologist* 28(3): 3. Sept.
Lipe, B[etty], 2000. Presidents Message. *American Conchologist* 28(4): 2. Dec.

LC50 of arsenic in Tehuelche scallop *Aequipecten tehuelchus* from San José Gulf in Patagonia, Argentina

Julieta Sturla Lompré, Erica Giarratano & Mónica Noemí Gil

The fishing industry is an important economic activity in Argentina, and in recent years there was a trend of growth in exports, with the main consumer countries Spain (27%) and China (14%). In 2015, 11% of total exports of marine resources were mollusks (Ministry of Agro-industry, 2016). Among the main commercial species of bivalves are the mussel *Mytilus edulis platensis*, the Tehuelche scallop *Aequipecten tehuelchus*, the Patagonian scallop *Zygochlamys patagonica* and the ribbed mussel *Aulacomya atra*. Seafood is considered as the main source of arsenic (As) in the human diet (Mania et al., 2015; Muñoz et al., 2005; Sigrist et al., 2016) and recent reports have shown the presence of this metalloid in some mollusks (Mohamed, 2008; Urtubey et al., 2016) and also in seaweed from North Patagonian Gulfs (Gil et al., 2015). San Jose Gulf is located in northern Patagonia (42°20'S, 64°20'W) in Valdes Peninsula and presents geographical and ecological conditions favorable for the settlement of natural populations of great commercial interest. In this place, the Tehuelche scallop has historically represented the support species of the shellfish activity, especially for the families of artisanal fishermen who live there. Thus, the human influence on the ecosystem is limited to artisanal shellfish activity and the area is not contaminated by urban-industrial effluents (Neyro, 2017).

Fig.1. Location of study site San Román in San José Gulf in Patagonia, Argentina.

The goal of the present study was to determine environmental concentrations of As in seawater, sediment, and tissues of scallops, and to define its LC50 by bioassays performed in independent aquariums.

Field and lab work

For the study of total As concentration in the field environment, samplings were carried out in San Román, located in the San Jose Gulf, in winter (August) and summer (January) (Figure 1). Samples of bottom seawater, sediment, and scallops *Aequipecten tehuelchus* (Figure 2) were collected by scuba diving and stored in bottles and plastic bags. In the laboratory, water samples were stored at 4°C, sediments were lyophilized and scallops were dissected into gills, digestive gland, and muscle. Analysis of total As in scallops and sediments was performed in the Laboratory of General Chemistry and Elemental Analysis (LAQUIAE) of National Patagonian Centre (CCT CONICET-CENPAT) using inductively coupled plasma (ICP) Agilent 720 with axial configuration and multi-element simultaneous detection, previous digestion with HNO_3 20 % using a NOVAWAVE SA microwave digester.

The toxicological bioassays were carried out during the winter season. Collected scallops were immediately transported in a cool box to the experimental aquarium in CENPAT to avoid thermal stress during the journey. Animals were acclimatized for one week in filtered seawa-

Figure 2. A) *Aequipecten tehuelchus* in experimental aquaria. B) Soft tissues of *A. tehuelchus*, C) Scallop not exposed to As and D) Scallop exposed to 7.9 mg As L^{-1} for 96 h.

ter at 13±1 °C, without feeding, with continuous aeration, 35 $^{0}/_{00}$ salinity, and 12:12h light:dark cycle. Short-term toxicity tests, with different concentrations of As and controls without As were run by triplicate with six organisms per aquarium containing 6 L of testing solution. Scallops were exposed to 4, 5, 6.3, 7.9, and 10 mg As L^{-1} for 96 hours and those that died were counted and removed every 24 hours. Stock solutions were prepared by dissolving appropriate amounts of sodium arsenite ($NaAsO_2$) in filtered seawater. After the experiment was completed, water was disposed of as Occupational Safety and Biosafety Committee of CENPAT requires. LC50 values and 95% confidence limits were estimated by probit analysis (Finney, 1971).

Relevant results

Total As was detected in sediment and in water samples, with important differences between seasons noted in the case of water (Table 1). This could be due to the seasonal vertical stratification that prevails in winter in the studied area (Amoroso and Gagliardini, 2010). Even though concentrations of As in sediments were below Canadian Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2002), levels measured in water were above the corresponding safety levels (Canadian Council of Ministers of the Environment, 1997). According to Neff (2002), mean concentration of total As in clean open-ocean waters is about 1.7 $\mu g.L^{-1}$, several times lower than the values found in this research. Because of the lack of anthropogenic activities in the San José Gulf, the presence of this metalloid in the environment would be the result of natural processes and probably related to contributions through groundwater and volcanic ashes (Conti et al., 2016; Farnfield et al., 2012; Nordstrom, 2002), however, further research is required to confirm this hypothesis.

Table 1. Arsenic values in water and sediment in San Román in winter and summer. *Canadian Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2002, 1997).

	Winter	Summer	Canadian Guideline value*
Water ($\mu g.L^{-1}$)	51	14	12.5
Sediment ($\mu g.g^{-1}$ dw)	4.55 ± 0.40	3.76 ± 0.23	7.24

Levels of total As measured in gills and the digestive gland exhibited strong seasonal variability, with the highest values registered in winter for the digestive gland (Figure 3). The opposite trend was found in gills, where the highest accumulation was measured in summer. These variations could be attributed to seasonal changes in reproductive cycle and food availability leading to alterations in body weight and composition (Giarratano et al., 2011). Conversely, there were no significant seasonal differences in As concentrations in muscle, suggesting that other factors than seasonal availability of food affect accumulation in this organ. Scallops are filter feeders and therefore accumulate high concentrations of many inorganic and organic pollutants in their tissues from dissolved and particulate phases present in the water column (Benali et al., 2015). Gills are one of the main pathways by which metal ions enter into aquatic organisms, being the first target organ of accumulation. There is an ion transfer from gills to digestive organs in bivalves and for this reason, metal concentrations are generally unstable in gills, unlike concentrations in other tissues that remain roughly constant (Zhang et al., 2015).

According to the Undersecretariat of Fisheries and Aquaculture of Argentina, mollusk consumption represented 12.5 % of the total of fishery products placed on the local market in 2016. Despite scallops representing a relatively small percentage in the Argentinian dietary makeup, it is worrying that As in all the analyzed tissues and in both seasons exceeded the limit of 1 $\mu g.g^{-1}$ in wet weight established by the Argentinian Food Code (2012). While the muscle is the tissue exported to consumers in the USA (1996 tons) and France (1300 tons), according to the Ministry of Agro-industry (2016), in Argentina, the entire soft body is consumed. Because of this, in order to assess the actual human risk, data of whole soft tissue concentrations, consumer characteristics (such as age and weight) and amount and frequency of intake are required.

LC50 bioassays

All physicochemical parameters were constant throughout the experiments and no mortality was recorded in controls. No animal died in concentrations below 5 mg $As.L^{-1}$ while 17 % mortality occurred in 6.3 mg $As.L^{-1}$ concentration after 96 h. For doses higher than 7.9 mg $As.L^{-1}$ the proportion of dead scallops increased after 72 h exposure and reached as high as 78% at 96 h. At the the highest

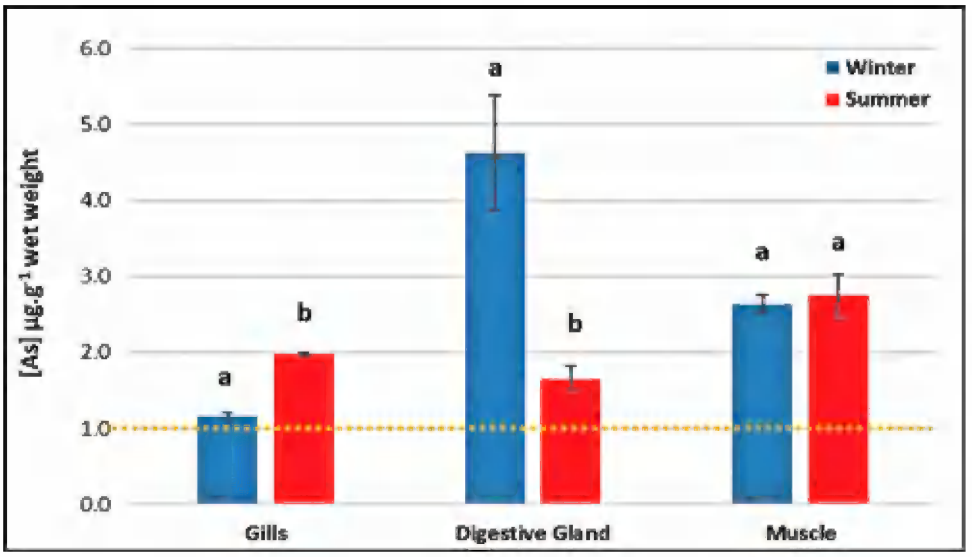

Fig. 3. Total concentration of As in gills, digestive gland and muscle of scallop *A. tehuelchus* from San José Gulf (mean values ± standard deviations). For each tissue, different letters indicate that seasonal variation is significant at $p < 0.05$ (no significant seasonal difference in muscle measurements). The dotted line represents the limit set by the Argentinian Food Code (2012).

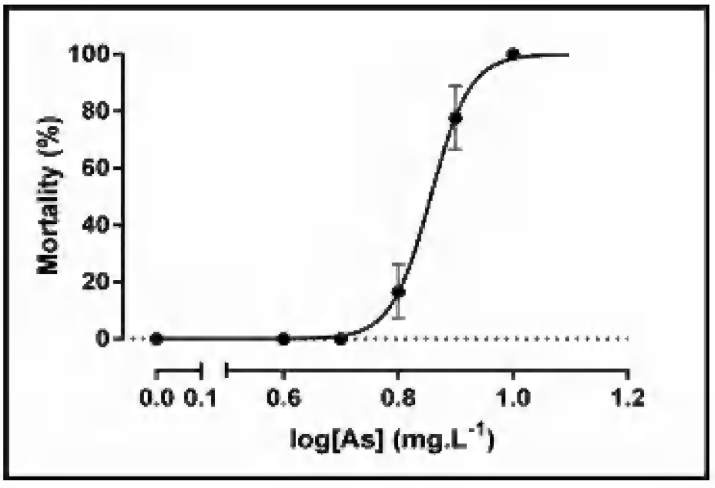

Fig. 4. Dose-response curve for *Aequipecten tehuelchus* exposed to As for 96 h (n=3; bars correspond to error standard).

concentration (10 mg As.L^{-1}), 100% mortality was recorded (Figure 4).

The lethal median concentration calculated for 96 h was 7.1 mg As.L^{-1} with 6.7 and 7.6 mg As.L^{-1} 95% confidence intervals. The results obtained in this study indicate that As presented low acute toxicity for *A. tehuelchus* compared with other scallop species such as *Argopecten irradians.* In that sense, Nelson et al., (1976) reported a lethal concentration of 3.4 mg As.L^{-1} for *A. irradians*, but this experiment was carried on at 20 °C in contrast with our study at 13 °C. The metabolism of animals is closely related to the temperature and that could be the reason for the remarkable difference between the species. It is likely that exposure of *A. tehuelchus* to natural stress due to high environmental As in San José Gulf provides an adaptation for tolerance to As.

Even though the high LC50 value would indicate that *A. tehuelchus* has As tolerance, this toxic could affect at cellular level, threatening the health of the organisms as well as the sustainability of the related shellfish activity. Thus, it can be expected that in the near future increased health risks to the scallop will be evident in biomarkers of exposure and effect, particularly in view of the high As levels found in San José Gulf.

The results of this study provide useful information not only for scientific community, but also for organisms responsible for artisanal fisheries management and seafood quality control.

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The authors wish to thank the National Parks Administration and Undersecretary of Conservation and Protected Areas (Chubut Province) for their permission to carry out the present study in the Natural Reserve of Valdes Peninsula in Chubut, Argentina. This research was partially supported by COA grant and it has been performed in the framework of the PhD research of Julieta Sturla Lompré, which is focused on the evaluation of the effect of natural contaminants in bivalves with commercial value. The authors thank Dr. Enrique Rodríguez for his help with the probit analysis.

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Marvel from the Deep

From Simon Aiken in the U.K. comes this intriquing image of *Alviniconcha hessleri* Okutani & Ohta, 1988 (approx. 26mm) from the Mariana Back-Arc Basin (about 3,200 meters in depth). At present there are five recognized species within the genus *Alviniconcha*, distinguishable only by DNA sequencing; morphologically they appear identical. This is not, however, a major concern for collectors as these cryptic mollusks come from deep-sea hydrothermal vents, a rather difficult collecting environment.

2017 Gulf Coast Shell Club Shell Show

Jim Brunner

The Gulf Coast Shell Club is proud to announce that this year's winner of the COA Trophy goes to the that non-native, invasive species known as the *Carolinian collectorum*, a.k.a. Ed Shuller & Jeannette Tysor for their 31 foot display, "Malacologists Important in Naming North Carolina Marine Mollusks." The duPont Trophy was won by Doug Thompson for "North Florida Pride," a 40 foot display of panhandle shells. The second winner of the new Vokes Trophy was Gene Everson, with a 26 foot display of striped shells - a very pretty and interesting display (the Vokes Trophy was first presented last year). Another 'major' award is the Helen Norton Trophy, awarded for a winning display of self-collected shells won by Linda and myself with a display called, "Three Bay Sampler," (31 feet of display cases on Northwest Florida Panhandle shells). And the Founder's Award was won by our Irish member Elizabeth Gibb with her display, "Shape Up," on different shell shapes. The scientific judges were Dr. Harry Lee and Dr. Richard Batt. The artistic judges were Dr. Robin Harris and professional artist Carol Mitchell.

Judging takes place at 5:15 pm. Exhibitors set up from 12:30 until 5. Around 3:15 we became concerned that one exhibitor who had 38 feet of displays had not yet appeared. A call indicated that they were in the process of loading their cars. At 4:57 they arrived. Then something magical occurred. Not a word was spoken but everyone in the room stopped what they were doing and headed out the door to the parking lot. In came the cases where knowledgeable people took over the task of making sure backboards were behind the proper cases. And, at 5:13 it was done! Judging began at its scheduled time of 5:15. We have been doing shows since 1976 and have never witnessed anything like this. Gulf Coast Shell Club – you rock!

Once again we were jam-packed in our venue with close to 400 feet of scientific displays and 40 feet of artistic displays. We also had a record attendance and the dealers made out quite well. All in all a very successful 20th Show.

Ed Shuller & Jeannette Tysor won the COA Award for their 31 foot display, "Malacologists Important in Naming North Carolina Marine Mollusks."

Our Irish member Elizabeth Gibb with her Founder's Award winning display on shell shapes.

Before the show we offer a field trip. We took some members and guests out in St Andrews Bay on a snorkeling trip. We visited several beaches and had an unexpected visitor - Buddy, the shelling dog. At one of the beaches on Shell Island he joined us and when we waded so did Buddy. When we got into the boat to change places so did Buddy. We knew his name because of his collar and tags. The island has only one house on it and no roads. We called the number on Buddy's tag and reached his owner. Buddy was returned home safe and sound after a day of profitable shelling.

Marco Island Shell Club 37th Annual Shell Show

Amy Tripp with her COA Award from the 2016 show (current image not provided).

The Marco Island Shell Club 37th Annual Shell Show and Sale was a great success, thanks to the people who supported the show by attending, viewing the exhibits, and making purchases in the gift shop. Proceeds benefit the Club's scholarships and grants program. THANK YOU TO ALL! This year's judges for the Scientific category were Alan Gettleman from Merritt Island, Florida, and John Chesler from Plantation, Florida; judges for the Artistic category were Sue Hobbs and Phil Dietz, both from Cape May, New Jersey.

2017 Marco Island Shell Show Scientific Award Winners:

The Conchologists of America (COA) Award - Amy and Bill Tripp for "Metro Tsunami Beach Shells/Marco Island."

The Du Pont Trophy - Doug Thompson for "Lion Paws."

The Dr. William O. Reid Plaque - Bob and Alice Pace for a fossil display.

The Top Novice Scientific Trophy - Gail Jacobson for "Oyster Shell."

Best Miniature Shells Trophy - Nancy Graev for *Melampus coffea* (Linnaeus, 1758)

Outstanding Self-Collected Marco Island Shell Collection Trophy - Paulette Carabelli

Florida Gulf Coast University presents the Most Outstanding Self-Collected Marco Island Shell - Mary Ann Coke for *Laevicardium pristis* (Bory de Saint-Vincent, 1827)

Florida Gulf Coast University presents the Best Photographic Mollusk Display - Amy and Bill Tripp.

The Friends of Rookery Bay present the Best Florida/Caribbean Self-Collected Single Shell Trophy - Amy and Bill Tripp for a lettered olive (*Oliva sayana* Ravenel, 1834).

Judges Special Merit Ribbons - Amy and Bill Tripp for "Metro Tsunami," and Mary Ann Coke for "Worm Shells."

Top Junior Awards - Amelia Vasquez and Hatti Hughes.

Keppel Bay Shell Club 50th Annual Shell Show

Sian Houghton and John Boyle with their COA Award for "50 Shells from Keppel Bay."

Second Annual West Coast Shell Show

Roger Clark won the COA Award for his *Neptunea heros* (Gray, 1850) exhibit. He also won Shell of Show for a self-collected specimen from Alaska.

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CONCHOLOGISTS OF AMERICA, INC.

In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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In This Issue

Front cover: *Chicoreus nobilis* Shikama, 1977, photographed *in situ* by Guido Poppe, off Mactan Island, Cebu, Philippines, 2008. This is one of the many muricids with three varices, in this case they are frondose. See the article by Dr. Emily Vokes on pages 4-10. Both the front cover image and this example of a cleaned specimen are courtesy of www.conchology.be, © 2017 Philippe & Guido Poppe - www.poppe-images.com

Back cover: A notional chambered nautilus constructed of paper by Mike Sanchez of the Natural History Museum of New Mexico. The story on how he constructs these is on page 37-38.

Editor's comments:

This was a fun issue to put together, with some great articles and lots of quality shell images. Our first article is by **Dr. Emily Vokes**, who writes on convergence in muricid shell morphology - or how come so many of them have three varices: whether winged (her concentration here), frondose, spiny, or rounded? She specifically looks at four subfamilies with 18 genera –all with three winged varices. In support of her article I received a number of quality shell images from Guido and Philippe Poppe of **Conchology.be** (including the live shot on the cover) and Marcus and José Coltro of **femorale.com**. Both of these dealers have quality web sites with shell images of thousands of specimens, and both have for years supported *American Conchologist.* I truly thank all of you.

Our second article is by the well-know author of *Bahamian Seashells* (1 & 2), **Colin Redfern**. Colin regales us with his six-week adventures in the shallows off the Caribbean island of Martinique, and in the lab, all in support of Dr. Philippe Bouchet (senior professor of malacology at the Muséum national d'Histoire naturelle (MNHN), Paris) and his ongoing worldwide biodiversity survey. Colin gives the reader a true taste of just what is involved in this project and the inner mechanisms that keep it running. We can all thank Colin for volunteering to spend six weeks in a tropical paradise.

Our third article is by **Yannik Roell**, a COA grant recipient, reporting on his research of shell morphology and environment in the Galapagos Islands. The landsnails he is researching are tiny, but his work is important in continuing our understanding of how different mollusks adapt to differing environments.

I finish off the articles in this issue with a review of the Nautilidae, the various species called chambered nautilus. I follow this up with a short piece on the paper shell art of **Mike Sanchez**. His 'paper nautilus' really has to been seen and handled to fully appreciate the artistry involved.

We also have some 'In Memoriam' announcements, a very important book review, and the report on the North Carolina Shell Show.

In closing, **I NEED MATERIAL!** Professionals and amateurs, get busy typing. If it is of interest to you, please share it with our readers. Thanks,

Tom Eichhorst

Convergence, a taxonomist's nightmare

Emily H. Vokes

Taxonomy – Orderly classification of plants and animals according to their presumed natural relationships (Merriam-Webster).

From the time of Aristotle people have tried to introduce some sense of order into the animal world. With the beginning of printing in the Fifteenth Century we see several works, often with beautifully hand-colored plates featuring illustrations of seashells and usually arranged in some sort of fancied natural order, but taxonomy really begins with Linnaeus (1758), who first attempted to arrange all animals into a simple scheme, based upon what he saw as related morphology. As discussed in a previous paper (Vokes, 2017, p. 3) what he considered a species is really today a genus, but he got people thinking about "systems" of nature (it is named *Systema Naturae*, after all) and he was soon followed by other workers, each trying to come up with a better "system." The best of these was Jean-Baptiste Lamarck, who refined Linnaeus's all-inclusive look at the entire Animal Kingdom, with a seven volume treatise (1815-1822) on just invertebrates ("Animaux sans Vertèbres"). Of course this included non-mollusks like insects, corals, and crustaceans, but vol. 7 comprises the best attempt to gather species of gastropods into smaller groups, all related and identifiable by shell morphology.

As Linnaeus's species are really genera, Lamarck's genera are really families, although it took us a while to recognize this. It is true that the members of each of his genera do share a morphological similarity, but the question becomes — how similar is similar? The species that comprise Lamarck's genus "*Murex*" are all similar in having three or more varices, and a more or less extended siphonal canal. With only 68 species this was good enough, but today with over 1400 species what were once deemed minor differences become more critical. Through the years we learned, in addition to the shell, to examine radulae, opercula, and body parts; and more recently we have discovered DNA and various microscopic techniques. Each new discovery indicates that what we once deemed a homogeneous group called "*Murex*" may be divided into some 176 genus-groups, divided into about 10 subfamilies (Vokes, 2012).

How do we begin to separate this multitude of species into what we hope are actually closely related groups? The answer is, with great difficulty. The subfamily Muricinae now comprises most of the species that were once considered "*Murex*." One of the primary criteria is still the presence of varices, which may number three or more. If there are only three, are they spiny (*Murex* s.s., *Vokesimurex*, *Siratus*), frondose (*Chicoreus*, *Triplex*), rounded (*Haustellum*, *Phyllonotus*, *Dermomurex*), or winged (*Pterynotus*, *Timbellus, Pterochelus*)? Examples are shown on plate 1. And what about the other subfamilies? It turns out that most of these are characterized by either having more than three varices, or even almost no varices at all.

Houart recently (2014) separated the spinose forms and earlier (1992) separated the frondose species into *Chicoreus* s.s, with a labral tooth, and *Triplex*, without a labral tooth. Those with rounded varices span the entire family Muricidae and are divided among numerous genera in several subfamilies, well beyond the scope of this study. The list of those groups that have three winged varices is astounding. There are about 140 species divided among the following genus-groups (in alphabetical order with no relationships recognized [differs slightly from Merle *et al.* and WoRMS]; * indicates type):

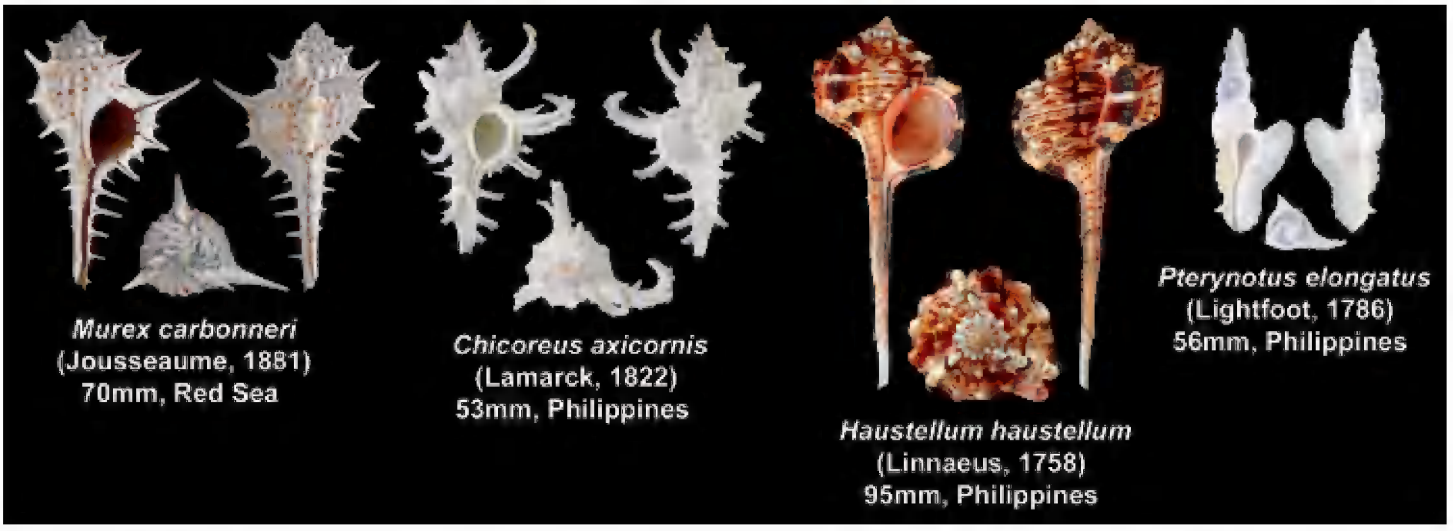

Plate 1. Representative muricids with three varices of differing characteristics: *Murex* – spiny, *Chicoreus* – frondose, *Haustellum* – rounded, and *Pterynotus* – winged. Images modified from H. Zell photographs, Wikipedia.com.

MURICINAE

Chicomurex Arakawa, 1964
- *C. elliscrossi* (Fair, 1974)
- *C. globus* Houart, Moe & Chen, 2015
- *C. gloriosus* (Shikama, 1977)
- *C. laciniatus* (G. B. Sowerby II, 1841)
- *C. lani* Houart, Moe & Chen, 2014
- *C. protoglobosus* Houart, 1992
- *C. pseudosuperbus* Houart, Moe & Chen, 2015
- *C. ritae* Houart, 2013
- *C. rosadoi* Houart, 1999
- *C. superbus* (G. B. Sowerby III, 1889)* **(Pl. 3-1)**
  [+ *C. problematicus* (Lan, 1981)]
- *C. tagaroae* Houart, 2013
- *C. turschi* (Houart, 1981)
- *C. venustulus* (Rehder & Wilson, 1975)

Chicopinnatus Houart, 1992
- *C. arbaguil* (Houart, 2015)
- *C. dharmai* (Houart, 2015)
- *C. guillei* (Houart, 1985)
- *C. laqueatus* (Sowerby, 1841)
- *C. loebbeckei* (Kobelt, 1879)
- *C. mocki* (Beals, 1997)
- *C. orchidiflorus* (Shikama, 1973)* **(Pl. 3-2)**

Naquetia Jousseaume, 1880
- *N. barclayi* (Reeve, 1858)
  [+ *N. annandalei* (Preston, 1910)]
- *N. cumingii* (A. Adams, 1853) [*trigonulus* of authors]
- *N. fosteri* (D'Attilio & Hertz, 1987)
- *N. jickelii* (Tapparone Canefri, 1875)
- *N. manwaii* Houart & Héros, 2013
- *N. rhondae* Houart & Lorenz, 2015
- *N. triqueter* (Born, 1778)* **(Pl. 3-3)**
- *N. vokesae* (Houart, 1986)

Ponderia Houart, 1986
- *P. abies* Houart, 1986
- *P. caledonica* Houart, 1988 **(Pl. 3-4)**
- *P. canalifera* (G. B. Sowerby II, 1841)
- *P. elephantina* Houart, 1990
- *P. magna* Houart, 1988
- *P. zealandica* (Hutton, 1873)*

Prototyphis Ponder, 1972
- *P. angasi* (Crosse, 1863)* **(Pl. 3-5)**
- *P. eos* (Hutton, 1873)
- *P. gracilis* Houart & Héros, 2008
- *P. paupereques* (Powell, 1974)

Pterochelus Jousseaume, 1880
- *P. acanthopterus* (Lamarck, 1816)* **(Pl. 3-6)**
- *P. akation* (Vokes, 1993)
- *P. ariomus* (Clench & Pérez Farfante, 1945)
- *P. duffusi* Iredale, 1936 [+ *P. phillipsi* (Vokes, 1966)]
- *P. triformis* (Reeve, 1845)
- *P. undosus* (Vokes, 1993)
- *P. westralis* (Ponder & B. R. Wilson, 1973)

Pterymarchia Houart, 1995
- *P. aparrii* (D'Attilio & Bertsch, 1980)
- *P. barclayana* (H. Adams, 1873)
- *P. bibbeyi* (Radwin & D'Attilio, 1976)
- *P. bipinnata* (Reeve, 1845)
- *P. bouteti* (Houart, 1990)
- *P. elatica* Houart, 2000
- *P. martinetana* (Roding, 1798)
- *P. triptera* (Born, 1778)* **(Pl. 3-7)**

Pterynotus Swainson, 1833
- *P. albobrunneus* Bertsch & D'Attilio, 1980
- *P. bednalli* (Brazier, 1878)
- *P. brianbaileyi* Mühlhäusser, 1984
- *P. elongatus* (Lightfoot, 1786)
- *P. laurae* Houart, 1997
- *P. miyokoae* Kosuge, 1979
- *P. patagiatus* (Hedley, 1912)
- *P. pellucidus* (Reeve, 1845)
- *P. pinnatus* (Swainson, 1822)* **(Pl. 3-8)**

Purpurellus Jousseaume, 1880
- *P. gambiensis* (Reeve, 1845)* **(Pl. 3-9)**
- *P. macleani* (Emerson & D'Attilio, 1969)
- *P. pinniger* (Broderip, 1833)

Siratus Jousseaume, 1880 (only 4 of 32 species)
- *S. alabaster* (Reeve, 1845)
- *S. beauii* (P. Fischer & Bernardi, 1857) **(Pl. 3-10)**
- *S. consuela* (A. H. Verrill, 1950)
- *S. tenuivaricosus* (Dautzenberg, 1927)

Timbellus de Gregorio, 1885
- *T. atlantideus* (Bouchet & Warén, 1985)
- *T. bilobatus* Houart, 2012
- *T. concavopterus* (Kosuge, 1980)
- *T. corbariae* Houart, 2015
- *T. crauroptera* (Houart, 1991)
- *T. emilyae* (Espinosa, Ortea & Fernández-Garcés, 2007)
- *T. fernandezi* (Houart, 2000)
- *T. flemingi* (Beu, 1967)
- *T. fulgens* (Houart, 1988)
- *T. goniodes* Houart & Héros, 2015
- *T. guesti* (Harasewych & Jensen, 1979)
- *T. havanensis* (Vokes, 1970)
- *T. leucas* (Locard, 1897)
- *T. levii* (Houart, 1988)
- *T. lightbourni* (Harasewych & Jensen, 1979)
- *T. marshalli* (Houart, 1989)
- *T. pannuceus* Houart & Héros, 2015
- *T. phaneus* (Dall, 1889)
- *T. phyllopterus* (Lamarck, 1822)
- *T. radwini* (Harasewych & Jensen, 1979)
- *T. richeri* (Houart, 1987)
- *T. rubidus* (Houart, 2001)
- *T. stenostoma* (Houart, 1991)
- *T. sublimis* Houart, 2012
- *T. vespertilio* (Kuroda *in* Kira, 1959) **(Pl. 3-11)**
- *T. xenos* (Harasewych, 1982)

Trialatella Berry, 1964
- *T. abyssicola* (Crosse, 1865)
- *T. antecessor* (Vokes, 1975) [+*T. cuna* (Petuch, 1990)]
- *T. boucheti* (Garrigues & Merle, 2014)
- *T. cunninghamae* (Berry, 1964)*
- *T. fajouensis* (Garrigues & Merle, 2014)
- *T. leali* (Houart, 1991)
- *T. neglecta* (Habe & Kosuge, 1971) **(Pl. 3-12)**
- *T. oxum* (Petuch, 1979)
- *T. pruvosti* (Garrigues & Merle, 2014)
- *T. seposita* (Houart, 1993)
- *T. tararensis* (Garrigues & Merle, 2014)
- *T. triclotae* (Houart, 2001)
- *T. trondleorum* (Houart, 1990)

OCENEBRINAE

Ceratostoma Herrmannsen, 1846
- *C. burnetti* (Adams & Reeve, 1849)
- *C. foliatum* (Gmelin, 1791) **(Pl. 4-13)**
  [+ *alata* Chemnitz (not avail.) & *C. monodon* (Eschscholtz, 1829)]
- *C. fournieri* (Crosse, 1861)
- *C. monoceros* (G. B. Sowerby II, 1841)
- *C. nuttalli* (Conrad, 1837)*
  [+ *C. aciculiger* (Valenciennes, 1846), *C. albescens* (Dall, 1919) & *C. albofasciata* (Dall, 1919)]
- *C. rorifluum* (Adams & Reeve, 1849)

Pteropurpura Jousseaume, 1880
- *P. benderskyi* Emerson & D'Attilio, 1979
- *P. bequaerti* (Clench & Pérez Farfante, 1945)
- *P. centrifuga* (Hinds, 1844)
- *P. dearmata* (Odhner, 1922)
- *P. deroyana* Berry, 1968
- *P. erinaceoidea* (Valenciennes, 1832)
- *P. esycha* (Dall, 1925)
- *P. fairiana* (Houart, 1979)
- *P. festiva* (Hinds, 1844) [+ *P. diminutus* (Dall, 1915) & *P. gaza* (M. Smith, 1940)]
- *P. macroptera* (Deshayes, 1839)* [+*P. carpenteri* (Dall, 1899), *P. petri* (Dall, 1900), *P. alba* (Berry, 1908) & *P. tremperi* (Dall, 1910)]
- *P. modesta* (Fulton, 1936)
- *P. plorator* (A. Adams & Reeve, 1845) [+ *C. expansus* (G.B. Sowerby II, 1860) & *C. brachypteron* (A. Adams, 1863)]
- *P. sanctaehelenae* (E. A. Smith, 1890) ?
- *P. trialata* (G. B. Sowerby II, 1834)
- *P. vokesae* Emerson, 1964 **(Pl. 4-14)**

MURICOPSINAE

Pygmaepterys E. H. Vokes, 1978 (only two species)
- *P. dondani* (Kosuge, 1984) **(Pl. 4-15)**
- *P. menoui* (Houart, 1990)

Subpterynotus Olsson & Harbison, 1953 (one fossil species)
- *S. textilis* (Gabb, 1873) **(Pl. 4-16)**

TRIPTEROTYPHINAE

Pterotyphis Jousseaume, 1880
- *P. fimbriatus* (A. Adams, 1854)
- *P. pinnatus* (Broderip, 1833)* **(Pl. 4-17)**
- *P. ryalli* Houart, 1996

Tripterotyphis Pilsbry & Lowe, 1932
- *T. arcana* (DuShane, 1969)
- *T. cancellatus* (G. B. Sowerby II, 1841)
- *T. colemani* (Ponder, 1972)
- *T. fayae* (Keen & Campbell, 1964)
- *T. lowei* (Pilsbry, 1931)*
- *T. norfolkensis* (Fleming, 1962)
- *T. robustus* (Verco, 1895)
- *T. triangularis* (A. Adams, 1856) **(Pl. 4-18)**

Plate 2. ***Siratus alabaster*** **(Reeve, 1845) 150mm, Philippines, adapted from H. Zell, Wikipedia.com.**

Here we have an overwhelming collection of convergence, which is how we describe distantly related creatures that have developed similar body forms to cope with some environmental challenge. One of the most frequently cited examples of convergence is the development of wings in bats (Mammalia) and birds (Aves), two groups of vertebrates that have modified the forelimbs into wings. Obviously the bats and birds developed wings in order to fly, but what has driven the Muricidae? What is it in their DNA that seems to call out for three winged varices? There must be some evolutionary benefit for the pattern to be so pervasive. But what is it? It is not likely to be defense from predators, as in the spiny species. I seriously doubt that it is sexual attraction, which figures so prominently in the ornamentation of birds ("See how strong and healthy I am"). It has been suggested that it gives stability to the shell. If a three-winged species is dislodged from a rocky perch, the shell spirals downward and lands with the aperture down, but few species regularly perch on rocky ledges. Perhaps it simply has the effect of making the shell bigger and less easy to swallow. Honestly, we do not know!

After Lamarck's separation of the Linnaean genera into more meaningful groups, other authors began the process of dividing them into ever smaller units, based upon morphology. Among the earliest was Swainson, who in 1833 proposed the genus *Pterynotus* for ALL the three-winged forms. Shortly thereafter, in 1837, Conrad proposed *Cerostoma* for the three-winged group easily separated by the presence of a labral tooth. As this name is preoccupied, it was subsequently emended to *Ceratostoma* by Hermannsen (1846). That seemed to be the limit until 1880, when Jousseaume (much ahead of his time!) proposed 47 new genera for the Family Muricidae, including *Siratus*, *Pterotyphis*, *Pteropurpura*, *Marchia*, *Naquetia*, *Pterochelus*, and *Purpurellus*. Today all of these are recognized as valid taxa, except for *Marchia*, which is considered a synonym of *Pterynotus*.

It is certain that the three-winged morphotype has a long geological history reaching back to the beginnings of the Cenozoic (66 MYA). There are species as old as *Pterynotus matthewsensis* (Aldrich, 1886) from the Paleocene (66-56 MYA), and numerous examples from the Eocene (56-33.9 MYA) from both the United States and France. In 1979, Harasewych and Jensen did a review of the genus *Pterynotus* and concluded that there were at least four distinct lineages, which they believed gave some insight into the evolution of the group, although they did not advocate dividing them into separate subgenera. They did note that the name *Timbellus* (type: *Murex latifolus* Bellardi, 1872) had been proposed for those thin delicate shells such as *Pterynotus phaneus* (Dall). This is the position I also took when I reviewed the Western Atlantic fossil and Recent species in 1992. In 2011, however, Merle *et al.*, in a monumental study of the fossil and Recent species of Muricinae from the entire world, divided up 89 Recent species of three-winged Muricinae (only) into the multitude of genus-groups cited above. In particular, they divided what was *Pterynotus* into two genera: *Pterynotus* s.s (type: *Murex pinnatus* Swainson) and *Timbellus* (type: *M. latifolius* Bellardi). *Timbellus* got the lion's share of the species (*Pterynotus* s.s – 8; *Timbellus* – 22). The subgenus *Timbellus* was proposed back in 1885 by an obscure Italian paleontologist Antonio de Gregorio, for two Pliocene fossil species, *Murex latifolius* and *M. latilabris,* both of Bellardi. Not accepted until the Merle *et al.* opus, this is by far the largest group of three-winged murices currently recognized, with not only 26 living species (some described since 2011), but another 59 fossil species, the majority (38) from Europe.

Merle *et al.*'s thinking is based upon a large study of the molecular phylogenetic framework of the Muricidae done by Barco *et al.* (2010) in which they examined, within almost 80 species of Muricidae, only two species of "*Pterynotus*" – *P. elongatus* (Lightfoot) and *P. fulgens* Houart. Among their conclusions (2010, p. 1037), only some of which confirmed previous taxonomic divisions, was that the genus *Pterynotus* is composed of at least two unrelated lineages. One includes *P. elongatus*, with a sculptural pattern similar to the type species *P. pinnatus*, and the second group includes *P. fulgens.* It is hard to determine exactly the defining morphological characteristic of *Timbellus*, but it seems primarily to be a smoother shell, and the two lines must represent the ultimate in convergence.

Within the various genus-groups cited in the Muricinae, all of the species in each group are more or less winged. The single exception to this is *Siratus,* in which the vast majority of species are spinose. There are, however, a handful of winged forms, including two of the most elaborately winged species of any group – *Siratus alabaster* (Reeve) (Pl. 2) and *S. beauii* (Fischer and Bernardi) (Pl. 3).

Other than in the Muricinae, three-winged forms are seen rarely, with two genera in the Ocenebrinae – *Ceratostoma*, with six Recent species, and *Pteropurpura*, with 15 Recent species. The tiny three-winged typhine subfamily Tripterotyphinae, with a total of 11 species in only two genera, is distinguished from all the other typhines, which have four varices. The Tripterotyphinae also have a more ornate surface ornamentation* and, in this case, it is probably the tubes that represent convergence.

In all of the other subfamilies we see no three-winged forms, with one very notable exception. In the Muricopsinae, in the otherwise four- to six-varixed genus *Pygmaepterys*, there are just two species that have somehow rediscovered the three-winged form, *P. dondani* (Kosuge) and *P. menoui* (Houart). And in the fossil record there is one relatively common species, *Subpterynotus textilis* (Gabb).

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*The strange *Cinclidotyphis myrae* DuShane, 1969, because of the ornate surface ornamentation and the inter-varical tubes, resembles species of *Pterotyphis* and has been placed by some in Tripterotyphinae, but the greatly reduced varices plus the open siphonal canal more closely resembles the genus *Galfridus*, and suggests placement in Ergalataxinae. The locality (West Mexico – *Cinclidotyphis vs.* Australia/New Zealand – *Galfridus*) does support placement in Tripterotyphinae. Convergence like this drives taxonomists crazy!

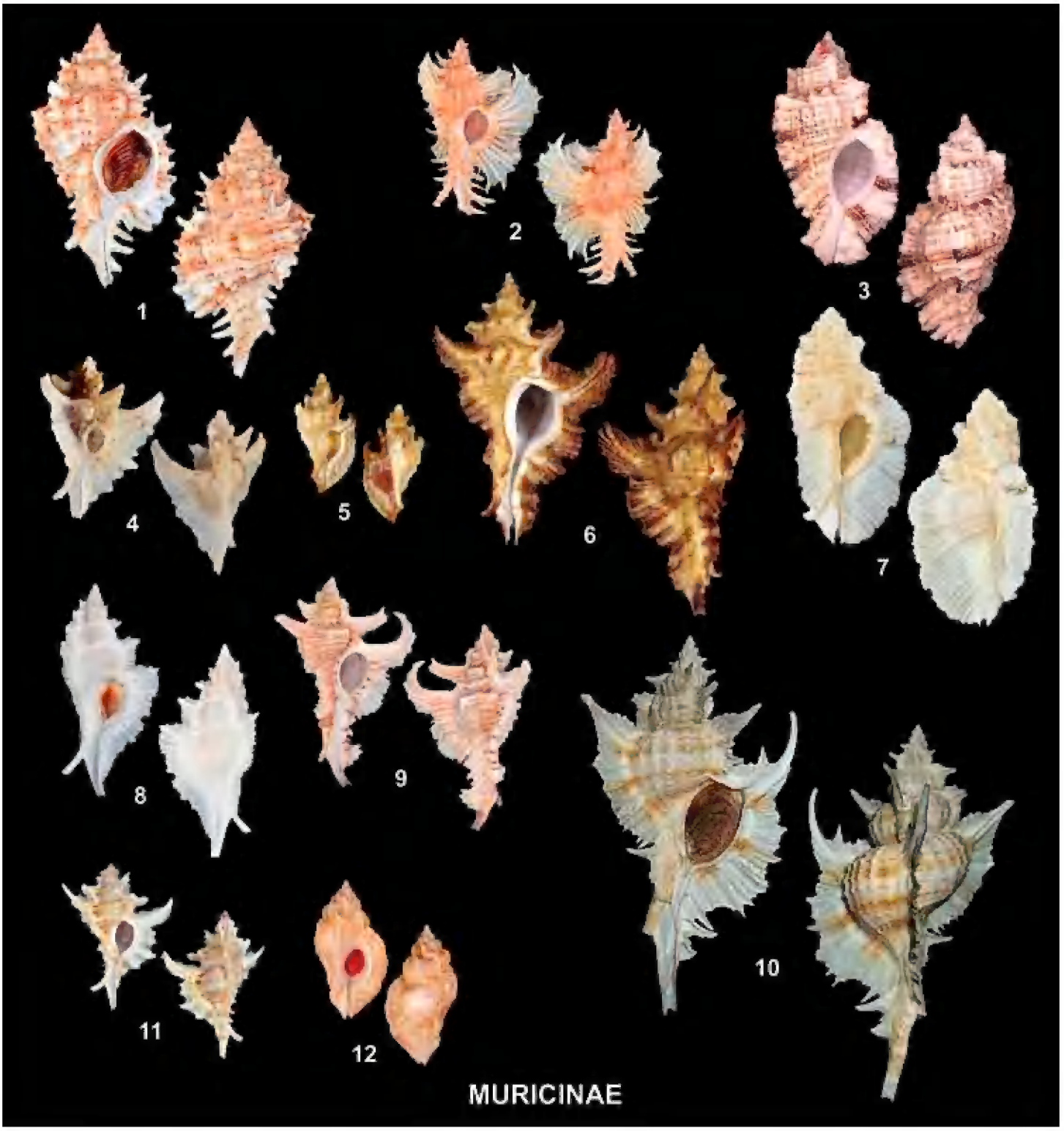

Plate 3. 1. *Chicomurex superbus* (G. B. Sowerby III, 1889) 65mm, Taiwan (www.femorale.com). 2. *Chicopinnatus orchidiflorus* (Shikama, 1973) 38mm, Philippines (www.femorale.com). 3. *Naquetia triqueter* (Born, 1778) 60mm, Indo-Pacific (www.femorale.com). 4. *Ponderia caledonica* Houart, 1988, 30mm, New Caledonia (www.femorale.com). 5. *Prototyphis angasi* (Crosse, 1863) 16mm, S. Australia (www.conchology.be). 6. *Pterochelus acanthopterus* (Lamarck, 1816) 64mm, NW Australia (www.conchology.be). 7. *Pterymarchia triptera* (Born, 1778) 55mm, Philippines (www.femorale.com). 8. *Pterynotus pinnatus* (Swainson, 1822) 28mm, Philippines (www.conchology.be). 9. *Purpurellus gambiensis* (Reeve, 1845) 43mm, Senegal (www.femorale.com). 10. *Siratus beauii* (P. Fischer & Bernardi, 1857) 75mm, Gulf of Mexico (www.jaxshells.org). 11. *Timbellus vespertilio* (Kuroda *in* Kira, 1959) 24mm, Japan (www.femorale.com). 12. *Trialatella neglecta* (Habe & Kosuge, 1971) 22mm, Philippines (www.femorale.com).

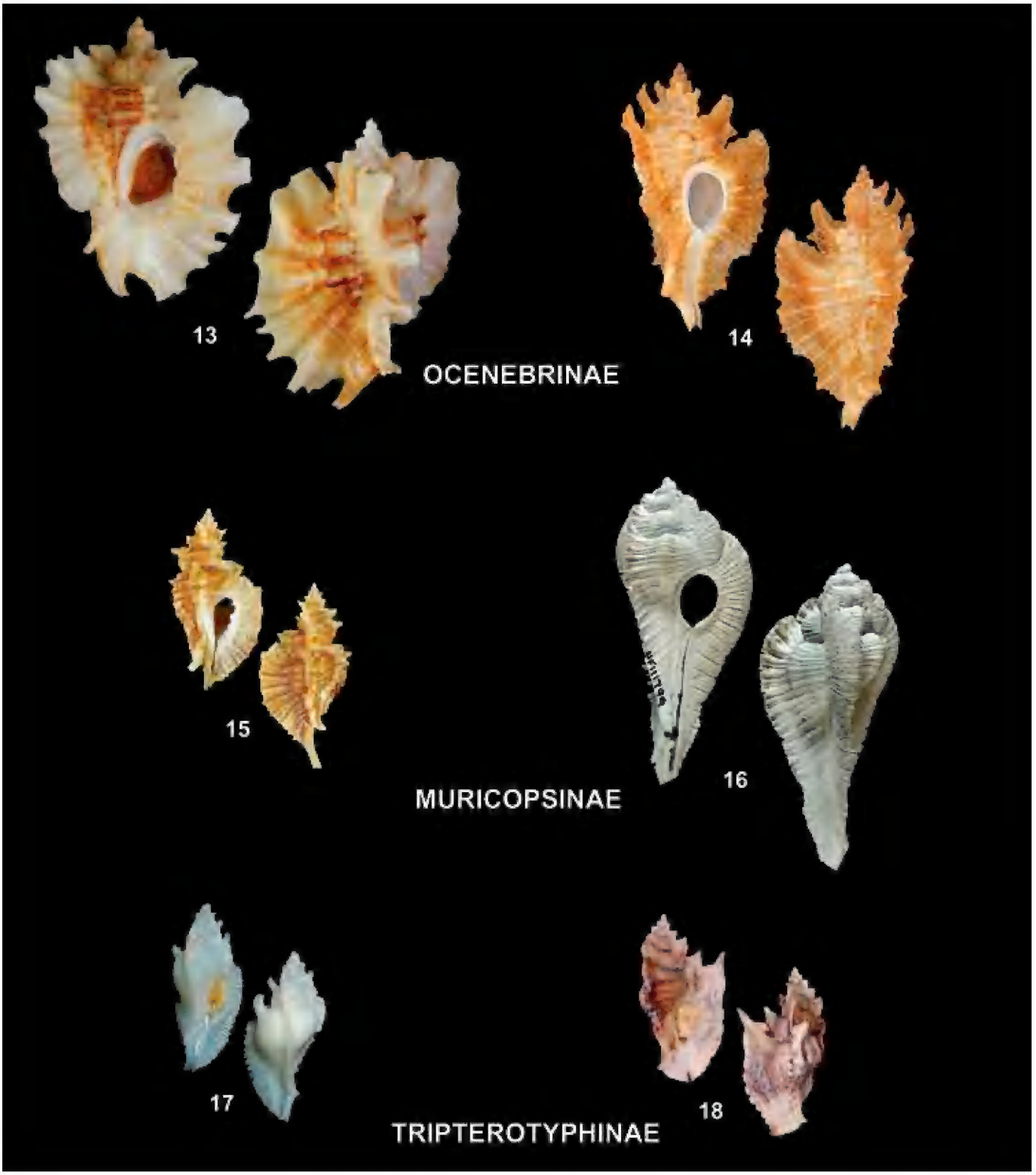

Plate 4. 13. *Ceratostoma foliatum* (Gmelin, 1791) 68mm, W. USA (www.femorale.com). 14. *Pteropurpura vokesae* Emerson, 1964, 54mm, W. USA (www.femorale.com). 15. *Pygmaepterys dondani* (Kosuge, 1984) 23mm, Philippines (www.conchology.be). 16. *Subpterynotus textilis* (Gabb, 1873) 56mm, fossil, Pinecrest beds, upper Pliocene, SE USA (courtesy of Florida Museum of Natural History). 17. *Pterotyphis pinnatus* (Broderip, 1833) 22mm, Bahamas and Caribbean (www.conchology.be). 18. *Tripterotyphis triangularis* (A. Adams, 1856) 30mm, Bahamas and Caribbean (www.femorale.com).

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Neptunea Award

Submissions are due prior to 1 June 2018

Guidelines can be found under the *Neptunea* Award section of the COA web page (wwwconchologistsofamerica.org) and in the *American Conchologist* September 2017 issue. Also additional information on a list of past winners may be found in the same issue of American Conchologist, page 37.

Return to the Caribbean: the Madibenthos Expedition to Martinique

Colin Redfern

In February of 2016 I had the good fortune to receive an email from Dr. Philippe Bouchet, senior professor of malacology at the Muséum national d'Histoire naturelle (MNHN) in Paris, inviting me to be a member of a team that would carry out a six-week biodiversity survey of the waters surrounding the Caribbean island of Martinique. Rapidly accepting the invitation before Dr. Bouchet had an opportunity to change his mind, I felt it best to mention that my scuba diving days were now behind me. I was relieved to receive a reply explaining that my contribution would consist of collecting in the intertidal and shallow subtidal zones, together with *ex situ* photography of living animals. The Madibenthos Expedition would be starting in September, and was named with reference to Madinina, an early name for Martinique (fig. 1).

Fig. 1. The author snorkeling for mollusks off Martinique (once called Madinina).

I had several months in which to make necessary upgrades to my macrophoto gear, the goal being to assemble a system that would be acceptable as carry-on luggage for the flight from Miami to Martinique. The backbone of this system was an Olympus macrophoto stand with extension bar that I had been using since 1980. My aging Canon EOS 20D was replaced by a 6D and I also upgraded to the latest Canon ring lite, the MR-14EX II. This equipment was attached to the stand via an Adorama focusing rail. My Canon MP-E 65mm macro photo lens was still in prime condition and I added a Canon 100mm macro lens that, for reasons explained later, was never put to use. I managed to squeeze all of this equipment into a 12x13 inch Mountainsmith camera case, together with spare battery and charger, remote shutter release, and angle viewer (fig. 2). This in turn fitted into a carry-on case with enough extra space to accommodate an Olympus TG-4, a small but very versatile waterproof camera.

Fig. 2. My camera and associated gear, all tightly packed to fit in a carry-on case.

The Madibenthos team consisted of 63 members from 10 different countries, and in addition to malacologists, included experts in such fields as the study of sponges, crustaceans, coral, reef fishes, and algae. The original plan was for the team to spend three weeks based in the capital of Fort-de-France on the Caribbean side of the island and three weeks on the Caravelle Peninsula on the Atlantic side. For various reasons, however, it became preferable to be based in Fort-de-France for the entire six weeks, where we were hosted by the French Navy in Fort Saint-Louis. I was greeted there by Philippe Bouchet, and soon had the opportunity to meet for the first time some people with whom I had

previously only corresponded. I first exchanged letters with Anders Warén in 1989, when he kindly reviewed and commented on my photos of eulimids from Abaco, Bahamas, so it was a pleasure to finally be able to thank him in person after so many years. I also had my first meeting with Jesús Ortea and Manuel Caballer, with whom I had collaborated on a study of the Bahamian Rissoellidae in 2014. Over the course of the next few days I would meet several other malacologists whose names were familiar to me from papers that they had authored or correspondence that we had shared. I hope that they will all forgive me for not using their titles in this report. There was a time many years ago when I could converse quite comfortably in French, and I was disappointed to find that I had almost completely lost that ability, however, everybody was kind enough to speak to me in English whenever possible.

Fig. 3. One of two large inflatable military-style tents that proved not quite capable of handling the heat and were wisely dismantled prior to tropical storm Matthew. The team coped with these issues and continued work.

One of my first impressions was the extent to which the logistical problems had been addressed. A shipping container from France had already delivered items ranging in size from inflatable dive boats to tweezers. This included, for example, scuba tanks and air compressors, dissecting microscopes and light sources for everybody that needed them, and trestle tables with chairs of appropriate height. Inevitably there were some unexpected problems. Work areas had to be reassigned when the interior of two large inflatable military-style tents (fig. 3) proved to be hotter than anticipated, and the tents had to be temporarily deflated when tropical storm Matthew passed over the island on September 28, disrupting scheduled activities for a couple of days. Lesser problems occurred almost daily, but a solution was always found.

Meals were taken in the naval canteen and it was here that Philippe introduced us all to each other and announced that breakfast would be available the following morning from 5:45 to 6:30 in preparation for a 7 o'clock departure from the docks. The three-person "intertidal team" consisted of (fig. 4, left to right) Laurent Charles (curator at the Museum of Bordeaux), myself, and Serge Gofas (professor at the University of Malaga).

It wasn't long before I found out that my knees were no longer reliable when maneuvering from one large slippery rock to another. I was much safer in the water and consequently spent many hours collecting while snorkeling. Together with local boat captains we visited every possible habitat, accessing shorelines from sandy beaches (fig. 5) or rocky promontories (fig. 6). We sampled mangrove-lined bays (fig. 7) and many areas of mixed habitats (fig. 8), using whatever collecting technique was appropriate. Serge Gofas is shown using a chisel (fig. 9) to collect live "worm shells" from the rocks and pulling a small hand dredge (fig. 10) to collect olivellids. In the final weeks of the expedition we quite often accessed collecting sites by road in the company of Régis Delannoye, a French member of the team who had lived on Martinique for the past twenty years and was very familiar with potential collecting sites.

Fig. 4 – Our three-person "intertidal team" (left to right) Laurent Charles (curator at the Museum of Bordeaux), myself, and Serge Gofas (professor at the University of Malaga). Our boat captain Maurice is in the background.


5

Figs. 5-8 show a typical variety of collecting sites for the "intertidal team." Fig. 5 – sandy beach habitat, fig. 6 – rocky promonitory habitat, fig. 7 – mangrove-lined bay habitat, fig. 8 – mixed habitat.


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Fig. 9 – Serge Gofas uses a chisel to collect "worm shells," and in fig. 10 he is shown hand dredging for olivellids.
Fig 11 – (a) Dominique Lamy after (b) retrieving a loaded dredge from 70 meters depth with (c) small capstan winch.


11a 11b 11c

The dredge boat left the dock each morning, sometimes very early to take advantage of calmer seas. I had the opportunity to be on board one morning to watch Dominique Lamy bring in a loaded dredge from 70m with the aid of a gas powered capstan winch, after which he was able to take a well-earned rest (fig. 11a-c). Meanwhile teams of divers were collecting material by various means, including brushing, vacuuming, and hand-picking. In 2012 Martin Snyder was a member of the Karubenthos Expedition to Guadeloupe and subsequently wrote a very informative article in *American Conchologist*. He described the team's collecting methods in detail and the same methods were used on Martinique. I would be unable to improve on those descriptions and recommend that readers access that article, which is available online (see below). Videos of these methods can also be seen on the Madibenthos website at http://madibenthos.mnhn.fr/fr/carnet-bord.

Great care was taken to ensure that all material was assigned a reference number to record the collecting event from which it was obtained, together with a prefix to denote the method of collection. The material was then taken to the "cold room" where it was laid out in trays, each with the reference number attached (fig. 12). Here for example (fig. 13) is a tray of sponges awaiting examination by Nicole de Voogd, an expert from the Naturalis Biodiversity Center in Leiden, Netherlands. Nicole can be seen on the left in fig. 12.

An important process takes place on the dock, where rocks and other assorted items brought in by diving and dredging are washed with sea water, with the results filtered through a series of sieves with holes of diminishing diameter. The final two "fractions" consist of fine and very fine material, most of which is destined for the photo lab for sorting under a microscope. Anders Warén is seen here in the cold room (fig. 15) with some material from a penultimate fraction, while a container of very fine material awaits examination in the photo lab (fig. 14). The photo lab was housed in the Fort's two-room "Lafayette" building, with Martinique's infamous Mont Pelée cloud-topped in the distance (fig. 16). For those unfamiliar with this volcano's history, the stunning events of 1902 are vividly described at https://www.earthmagazine.org/article/benchmarks-may-8-1902-deadly-eruption-mount-pelee.

The lab consisted of two rooms, the smaller of which was mainly used (fig. 17) by José "Pepe" Espinosa, Jesús Ortea, and Manuel Caballer. Manuel had assembled a small aquarium, and most living opisthobranchs, marginellids, cystiscids and rissoellids were photographed or drawn with camera lucida in this room. In the final weeks the room was also used by Marcel Koken for the study of bioluminescence in marine invertebrates. The larger room (fig. 18) was used for sorting and photography, with one corner reserved for algae study. During our time at Fort Saint-Louis more than 900 students from local schools visited the lab and had the opportunity to observe small living mollusks through the microscopes (Fig. 19). Philippe Maestrati (on the right, fig. 20) made all the decisions as to which specimens needed to be photographed and which should be selected for barcoding. He had a remarkable ability to remember the species that had already been photographed, so that no unnecessary duplications took place. The specimens selected for barcoding were then taken to the "tissue clipping lab," where Giulia Fassio and Barbara Buge (fig. 21) prepared them for the molecular sequencing that would eventually take place at the Museum in Paris. Preparation included the challenging work of removing soft parts from the shell so that tissues or whole specimens could then be fixed and preserved in ethanol.

On our first day in the photo lab we agreed that it would save valuable time if I avoided changing lenses on my camera, so it was decided that I would work only with my MP-E 65mm macro photo lens, photographing living specimens that were about 5mm or less in length. Larger specimens were photographed by Laurent Charles or Philippe Maestrati. All photos were logged, and after six weeks I had photographed more than 550 specimens, taking several photos of each specimen in order to ensure that all aspects of the living animal were represented. Anyone familiar with this process will be aware of the frustrating tendency of mollusks to retract into their shell at the very moment that you have them in sharp focus. A few of the resulting photos are shown in fig. 22, not reproduced to scale. It would be premature to attempt identification of all these species, but the photos will give some indication of the great variety of small mollusks collected by members of the expedition. During many years of collecting in the Bahamas I managed with great difficulty to collect a few empty shells belonging to genera such as *Sansonia* and *Euchelus*, so it was a memorable experience to observe live specimens crawling around in a dish below my camera lens. I was unfamiliar with many of the photographed species and had certainly never expected to have the opportunity to photograph living solenogasters, one of which is included in fig. 22.

It was not all work and no play. The whole team would sometimes take a day off, with most of us meeting for lunch or dinner at a restaurant elsewhere on the island. On one occasion Régis Delannoye guided a group of us to a couple of locations in the rainforests of northern Martinique (fig. 25) and five of us are shown here in a variety of rainforest attire – (fig. 27, left to right: Régis Delannoye, Jesús Ortea, myself, Pepe Espinosa, and Manuel Caballer). Shortly afterwards I had my first encounter with a tarantula (fig. 24). I'm not usually comfortable around spiders, but I must admit that this one was very handsome in its natural habitat. Doubtless I would have felt differently if observing it on the ceiling above my bed. Sometimes the word would be passed around our work rooms at the naval base that cocktails and hors d'oeuvres would be available in the dock area

Fig. 12 – collected material awaits sorting in the cold room.

Fig. 13 – a tray of sponges awaiting examination by Nicole de Voogd, an expert from the Naturalis Biodiversity Center in Leiden, Netherlands.

The final two "fractions" consist of fine and very fine material, most of which is destined for the photo lab for sorting under a microscope. Fig. 14 – a container of very fine material ready for examination in the photo lab while fig. 15 – Anders Warén is seen in the cold room with material from a penultimate fraction.

Fig. 16 – our photo lab at the entrance to Fort Saint-Louis, with the infamous volcano, Mont Pelée in the background.

Fig. 17 – denizens of the smaller photo room, (L to R): José "Pepe" Espinosa, Jesús Ortea, and Manuel Caballer.

Fig. 18 – the larger of the two rooms was used for sorting and photography, with one corner reserved for algae study.

Fig. 19 – the larger room was also where more than 900 students from local schools were able to observe the normally unseen world of microscopic-sized living mollusks.

Fig. 20 – Philippe Maestrati (on the right) made all decisions as to which specimens needed to be photographed and which should be selected for barcoding.

Fig. 21 – specimens selected for barcoding were taken to the "tissue clipping lab," where Giulia Fassio and Barbara Buge prepared them for the molecular sequencing that would eventually take place at the Museum in Paris.

Fig. 23 – Philippe Bouchet thanks our hosts for their hospitality at an event that featured a choice of delicious crêpes and a welcome respite from lab work.

Fig. 24 – my first encounter with a tarantula in the wild. This is a protected species in Martinique.

Fig. 22 – Some of the more than 550 living specimens photographed (not reproduced to scale, but with a maximum size of about 5 mm). Many specimens will require further study for correct identification. Note the solenogaster ("s" shaped, one down from the top row, in the middle).

Fig. 25 – Régis Delannoye guided a group of us to a couple of locations in the rainforests of northern Martinique. Fig. 26 (below) - at one location Laurent Charles pointed out that this was prime habitat for some species of land snails.

Fig. 27 – five intrepid rainforest explorers, left to right: Régis Delannoye, Jesús Ortea, myself, Pepe Espinosa, and Manuel Caballer.

at 5 o'clock, and Philippe Bouchet (fig. 23) thanked our hosts for their hospitality at an event that featured a choice of delicious crêpes. We were invited to tour a French frigate that was docked at the base for a few days and there were also other opportunities for relaxation and exploration.

Early estimates suggest that more than a thousand mollusk species previously unrecorded from Martinique were collected, including a surprising number that were not recorded from Guadeloupe in the 2012 expedition. In due course many of these will prove to be new to science and several have already been described. By the end of the expedition the team had conducted 506 collecting events and it was calculated that the 63 members had spent a combined 19,700 working hours in the labs and in the field. Preserved material had required the use of 211 gallons of ethanol, generously contributed by the Plantations Saint James on Martinique. Funding also came from the European Regional Development Fund (ERDF), the Collectivité Territoriale de Martinique (CTM), and Banque Régionale d'Escompte et de Dépôt (BRED). Coordinated by MNHN, the expedition was spearheaded by the French Agency for Marine Protected Areas (AAMP), the Martinique Directorate of the French Ministry for the Environment (DEAL), and the Martinique Bureau of Water (ODE). An important result of the survey was the observation that the health of Martinique's marine environment has been severely compromised by pesticide and fertilizer run-off, overfishing, and the inevitable stresses of an ever-increasing island population. Unfortunately it will be very difficult or perhaps impossible to reverse this trend.

It is difficult to imagine that anybody else with Philippe Bouchet's malacological credentials could be better suited to the task of organizing and leading an expedition of this size and complexity. Somehow he manages to overcome the inevitable unforeseen challenges without ever losing his multilingual sense of humor and it was a great pleasure to be a member of his team.

Snyder, M. A. 2012. The 2012 Guadeloupe Biodiversity Expedition. *American Conchologist* 40(3):4-10. Available online at http://www.conchologistsofamerica.org/publications/pdfs/201209.pdf

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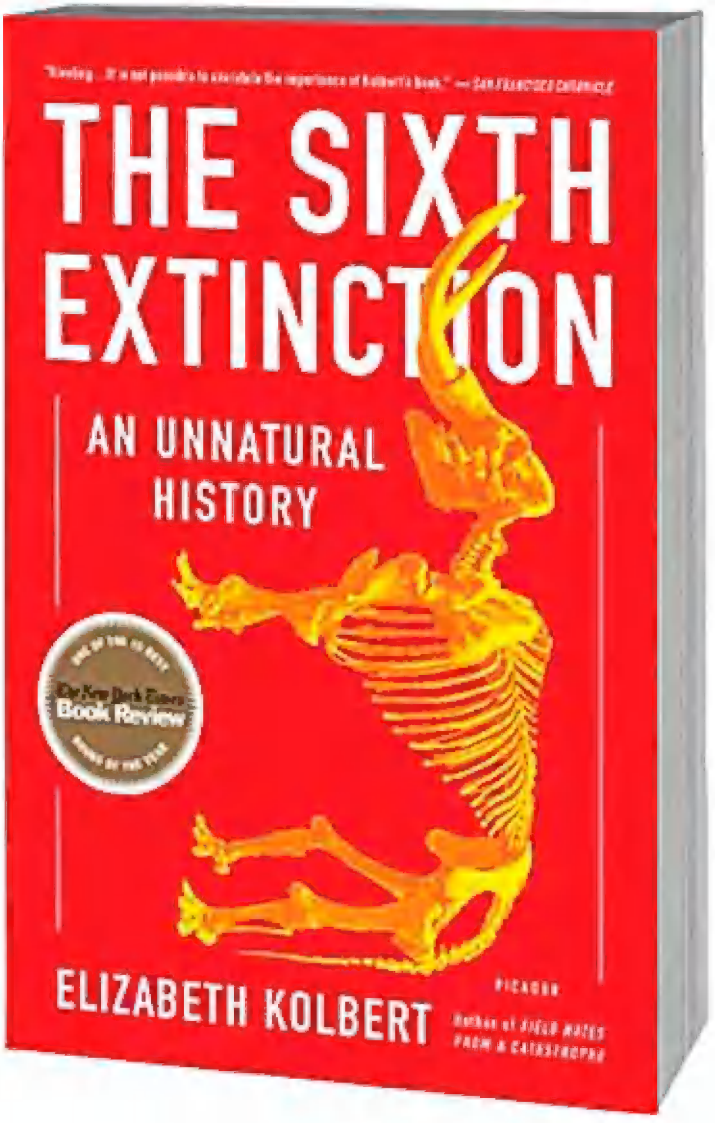
The Sixth Extinction: An Unnatural History

by Elizabeth Kolbert

ISBN (hard cover) 1250062187, (paperback) 978-1250062185, (ebook) 978-08050-9979-9; published in 2014 by Harry Holt & Co., N.Y., New York & Picador, Reprint edition (January 6, 2015), hard cover 5.5 x 8 inches, 336 pages. Cost approximately $17.09 hardcover, $10.87 paperback, &9.99 eTextbook, and $28.40 Audio CD.



It seems this is the year for belated book reviews. Last issue it was the 2014 publication of Roland Houart's superb *Living Muricidae of the World* and we now have another book from 2014 that I believe is important enough to bring to your attention. *The Sixth Extinction* by Elizabeth Kolbert is no obscure shell reference book - although the author does discuss molluscan extinctions. This is a New York Times best seller (one of New York Times 10 best books of the year) and a Pulitzer Prize winner. The San Francisco Chronicle stated, "It is not possible to overstate the importance of Kolbert's book." So, others have pretty much established its importance, to which I must now add, it is eminently readable - a page turner. The author weaves science with story-telling in such a manner that the awe-inspiring and sobering facts of what is happening in the world around us reads like the best thriller.

Much of what is covered in this volume is probably known to the majority of our readers, at least in a peripheral sense. Most shell collectors are interested in nature in general and are thus at least vaguely or perhaps keenly aware of geologic extinction events, the modern plight of millions of dying bats in the US, the disastrous effects of big game poaching in Africa, the *chytrid* fungus killing off entire species of frogs in the New World, etc. If you read *The Sixth Extinction*, you will not only add flesh to this skeletal framework of knowledge of these events, but you will learn so much more. These topics are but four of the 13 chapters in this book.

The first chapter of the book begins with, "Beginnings, it's said, are apt to be shadowy. So it is with this story, which starts with the emergence of a new species maybe two hundred thousand years ago. The species does not yet have a name–nothing does–but it has the capacity to name things." The author then goes on to outline and explain the Sixth Extinction, a mankind-caused event happening around us. This is not dry stuff. She posits (and scientists agree) about five earlier catastrophic extinction events and carefully makes the case for an additional such event, the sixth, taking place right now. The book is an exciting, fascinating, enjoyable (though sometimes downright scary) read, and certainly something worthy of attention by each and every one of us. The very concept of extinction, that a species could literally disappear from the earth, has only "recently" gained a foothold in our thinking. Linnaeus was literally describing shells and setting up our modern taxonomic system decades before the concept of extinction was conceived much less accepted! Really. Read the second chapter.

The chapter on ocean acidification and reef destruction is one of the scary chapters. And unlike a dry recounting of research efforts, Elizabeth Kolbert was there. She traveled the world to personalize the facts presented in this book. Accompanied by relevant scientists, she investigated the varied and often disturbing facets of this story – crawling through bat caves, diving in poisonous waters, trekking through rainforests, or digging through dusty museum relics. Elizabeth Kolbert brings to life what is perhaps the most serious event of our lives.

I bought the ebook for my Kindle, but after reading it I purchased the hard cover for my library. This is critically important stuff, presented with readable clarity and vivid conceptions.

Tom Eichhorst

COA Grant Summary

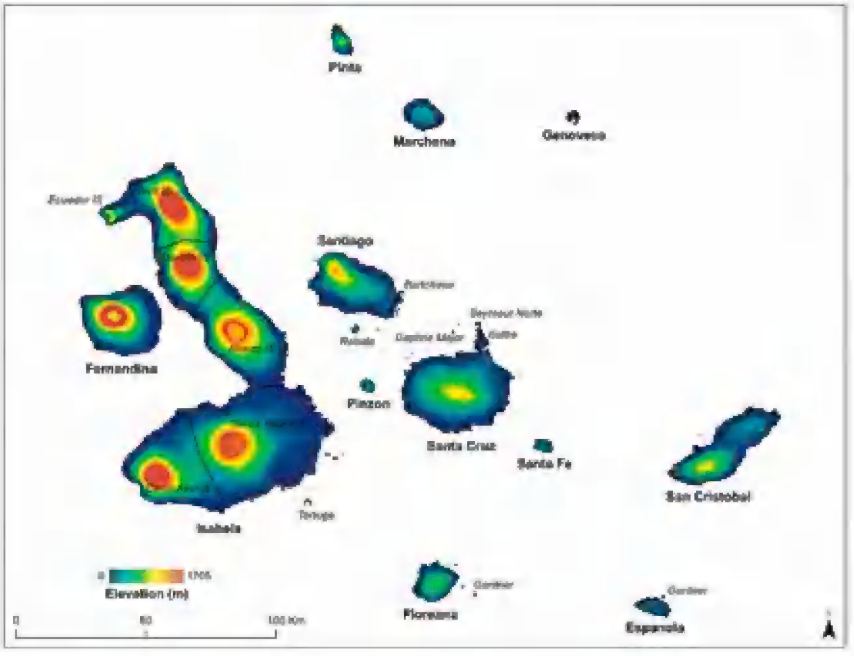
Yannik Roell

In May 2016, I was awarded $2,200 by COA to conduct my master's research in the Galapagos. I helped offset the costs of a two-month field season with this money from the grant. The grant was used to pay for flights from Idaho to Galapagos, transportation while on the islands, and housing.

During this time, I collected morphological and physiological measurements on a genus of terrestrial land snails, *Naesiotus*. There were 276 snails collected which brought my total with my 2015 field season to a total of 471 snails. The new field season allowed me to extend my work to 2 more islands and 6 more species for a total of 14 species across a wide range of elevational gradients. Portable temperature recording devices (iButtons) were placed on one of the new islands to start collecting fine-tuned temperature data throughout the year.

The author in the Galapagos study area.

My overall research is to understand the effect of environmental variation on species richness and trait diversity across the Galapagos Archipelago. The goal of my dissertation is to understand how variation in habitat can promote changes across islands and in species. The first objective of this project is to link how island ontogeny* shapes the number of species found on islands. The second objective is to quantify the association between habitat features and variation in morphology and physiology of species. The grant has helped fund my second objective.



For my first objective, I use the species richness of terrestrial vertebrates, invertebrates, and plants of the Galapagos. The species richness for each island will help determine the effect of different topography measures on a range of taxonomic groups. Each taxonomic group will be tested to see if they follow the hump-shaped trend that the general dynamic model (GDM) of oceanic island biogeography predicts. The GDM will be extended by determining if there is one topographic index that can be used across a range of taxa or if each taxonomic group has a different index that is most important to measure topographic complexity.

For my second objective, I use a well-studied adaptive radiation in the Galapagos, the land snail *Naesiotus*. *Naesiotus* inhabits most islands in the Galapagos, from lower elevations that are hot and arid to higher elevations that are cool and humid. Along this environmental gradient these species exhibit diverse shell sizes and shapes. Shell morphology is likely important for many different aspects of snail survival. Shells provide protection against predation, prevent water loss, and dissipate heat to avoid desiccation. Previous studies have shown that Galapagos snails with more elongated shell shapes tend to be found in more arid zones and snails with rounder shell

* The study of the origination and development organisms from the time of fertilization of the egg to the organism's mature form, or in this case, of an island from formation to maturity.

shapes tend to be found in more humid zones. This phenotypic-environment association suggests that snails with different shell shapes have adapted to different habitats; however, morphological adaptation is likely to be associated with a difference in metabolic costs related to building and maintaining a shell.

Thus although work in this system using phylogenetically controlled analyses has identified a strong link between shell morphology and ecology, a thorough study of physiological variation within and among species is needed to identify the proximate mechanisms and ultimate causes responsible for ecological diversification.

I appreciate the opportunity that was given to me by being able to use the grant money to have an extended field season and further my research. The money was used effectively to make the quality of my research even better.

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One of the elongated species, *Naesiotus reibischi* Dall, 1895, 9-10mm, crawling on one of many thorned bushes of the Galapagos.

Raw snails sold for consumption in Otavalo, Ecuador.

***Naesiotus albermarlensis* Dall, 1917, 10-11mm.**

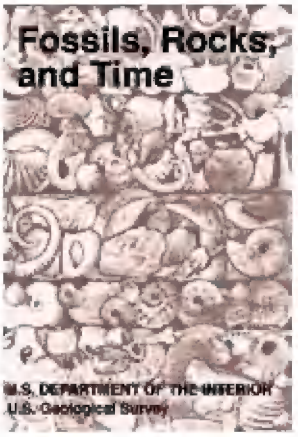
***Naesiotus wolfi* Reibisch, 1892, 10-12mm, with a moderately elongated shell.**

***Naesiotus albermarlensis*, up close and personal (note the leaf hopper).**

Dr. John Pojeta, Jr. passed away on 6 July 2017. John was a graduate of the University of Cincinnati, where he met and formed a life-long partnership with his wife Mary Lou. After graduation, he was appointed to the U.S. Geological Survey and served as geologist, paleontologist, and eventually Branch Chief through a rich and distinguished career. Since retirement in 1994, he remained active as Scientist Emeritus with the U.S.G.S. and as Research Associate of the Department of Paleobiology at the Smithsonian's Museum of Natural History.

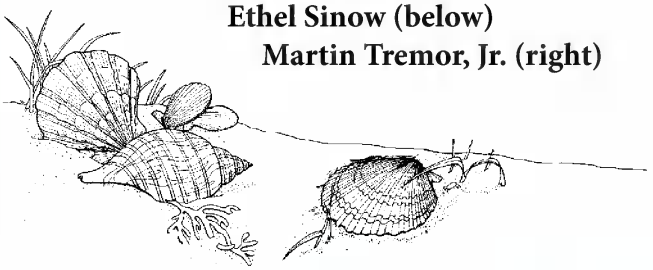
Throughout his career, John focused on Ordovician and Cambrian mollusks. He will be remembered for his diligence and teamwork on research of fossils from Kentucky, Australia, and Antarctica (to name three of many areas in which he worked). He and Mary Lou were both enthusiastic supporters of numerous professional organizations, but especially of the Paleontological Research Institution and the Paleontological Society. Their joint contributions are recognized by the Pojeta Award (paleosoc.org/grants-and-awards/pojeta-award), commemorating their dedicated service to the Paleontological Society for several decades. The award, in part, recognizes exceptional service in the field of paleontology, above and beyond expected or existing roles or responsibilities.

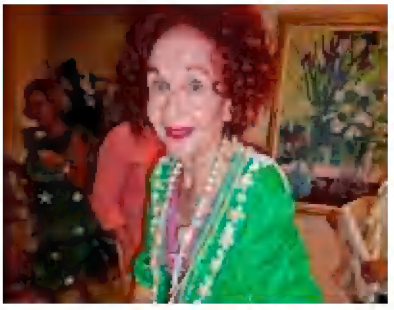
During the 1990s, John worked with the Association of Applied Paleontological Sciences (AAPS) in the creation of their scholarship program. He was instrumental in getting the word out to graduate students in invertebrate paleontology about the scholarships offered by this paleontological organization. For much of the 1990s John worked with Neal Larson and others to get names of candidates for the James R. Welch Scholarship. Because of his diligence and cooperation many students were able to benefit from the support of AAPS to help fund their collecting so that they could complete their research in order to complete their degrees. John authored a number of professional papers. Perhaps his best known work is his work with Lucy Edwards on the 1997 *Fossils, Rocks, and Time* (right). Online: https://pubs.usgs.gov/gip/fossils/contents.html & as a pdf at: https://pubs.usgs.gov/gip/7000011/report.pdf



In Memoriam:

John Pojeta, Jr. (left)
Ethel Sinow (below)
Martin Tremor, Jr. (right)





Ethel Sinow, long-time Sanibel-Captiva Shell Club member and supporter, passed away on 26 March 2017 at the age of 93. She and her husband Sidney moved to Sanibel in the early 1990s. Ethel began studying piano at age 7 and at the age of 12 she gave her first public piano concert at Orchestra Hall in Chicago. She graduated from Hyde Park High School at 16 and continued her piano studies at the Chicago Music College and Roosevelt University. Ethel gave piano concerts for the next 60 years in venues throughout the United States.

Ethel became a docent at the Bailey-Matthews Shell Museum (below) when it opened in 1995. In 2015 she was honored for her twenty years of continuous service at the museum. She was an ardent sheller and could be found most every day walking the Middle Gulf beaches. She began entering scientific exhibits in the annual club shell show in 2000 and continued through 2016, winning a number of ribbons and awards over the years. Ethel loved to help people understand shells and shelling, and would spend all three days of the shell show enthusiastically answering show attendees' questions. Her dependable help and knowledgeable presence in the scientific room will be greatly missed.

Martin E Tremor, Jr passed away on Saturday evening, October 14, 2017, in Beach, North Dakota. He was 83. Martin had recently worked on an all-inclusive and very impressive shell show exhibit of the cockles, Cardiidae. I don't think I ever heard how he came to choose cockles to learn about, as he accumulated the shells for his multi-award-winning exhibits, but he did a fabulous job in a fairly short time. We became friends in his quest for information about these shells, as well as specimens, and I shared shells with him from my collection. He was single-handedly responsible for renewing my excitement over my own long-time collection of Cardiidae, the only shells I collect, and I will always be grateful to him for that, and for his warm friendship. Conrad Forler, his life partner of 40 years, always helped Martin with his beautiful shell show exhibits, and will care for the beautiful Australian shepherd dogs they shared, Gemini and Charley.

Sue Hobbs

Aside from award winning shell show exhibits (the top photo shows Martin with his COA Award from a recent shell show), Martin was an avid and quite successful field collector. He published a number of articles on his different shelling trips. Some of these may be viewed online on the Jacksonville Shell Club web page. Three such articles are:

All the Wonders of Maui – www.jaxshells.org/hawaii.htm

Make Mine Eleuthra – www.jaxshells.org/eleuth.htm

A shelling Trip to Key West – www.jaxshells.org/kwest.htm

From *Tidelines*, the St. Petersburg Shell Club newsletter (September 2016) came this image of a 2,400-year-old sculpture in marble of a Mediterranean pelican's foot, *Aporrhais serresianus* (Michaud, 1828). The image was originally posted by Andrea Glez on Archaeology & Prehistoric Wonders, and then on Facebook (12 June 2016) by Molluscan Pictures. The sculpture is dated at 425 BC, from Greece.

There are two subfamilies in the family Aporrhaidae: Aporrhainae Gray, 1850, with a single genus, *Aporrhais* Costa, 1778, and four extant species (*A. pesgallinae* Barnard, 1963; *A. pespelicani* (Linnaeus, 1758); *A. senegalensis* Gray, 1838; and *A. serresianus* (Michaud, 1828). The second subfamily is Arrhoginae Popenoe, 1983, with a single monospecific genus, *Arrhoges* Gabb, 1868, and the single species, *A. occidentalis* (Beck, 1836). There are dozens of fossil genera within the family and a plethora of synonyms. Below is an actual *Aporrhais serresianus*, in this case the typical dextral shell, rather than the sinistral shell as sculpted.

The common but little-known chambered nautilus

Thomas E. Eichhorst

10,000 Nautiluses

Approximately 500 million years ago (MYA), during the Late Cambrian period, ocean-going shelled predatory cephalopods developed - the nautilids or nautiluses. The term nautilus is from the Latinized Greek *ναυτίλος* or sailor. The fossil record is rather extensive and shows this group to be major predators during the Ordovician period (488.3-443.8 MYA) to the start of the Silurian period (443.7-419.3 MYA) with some species growing to over eight feet in length. Some authorities believe the explosion of nautilus species was responsible for the extinction of the trilobite - its natural prey (Ward, 1988). The extinct nautilus genus *Lituites* flourished during this period and fossil shells have been recovered from North America, South America, Europe, and China. These shells formed in a planospiral shape during juvenile growth and then extended in a straight section of growth equal to or exceeding the length of the spiral portion. The shells were divided into separate chambers similar to that seen in modern nautilids.

Nautilus pompilius **Linnaeus, 1758, the chambered nautilus, photographed at night off Manus Island, in 2008 by Charles Rawlings. Millions have been collected and sold over the past couple hundred years, yet there is still much we do not understand about this fascinating creature and its close relatives.**

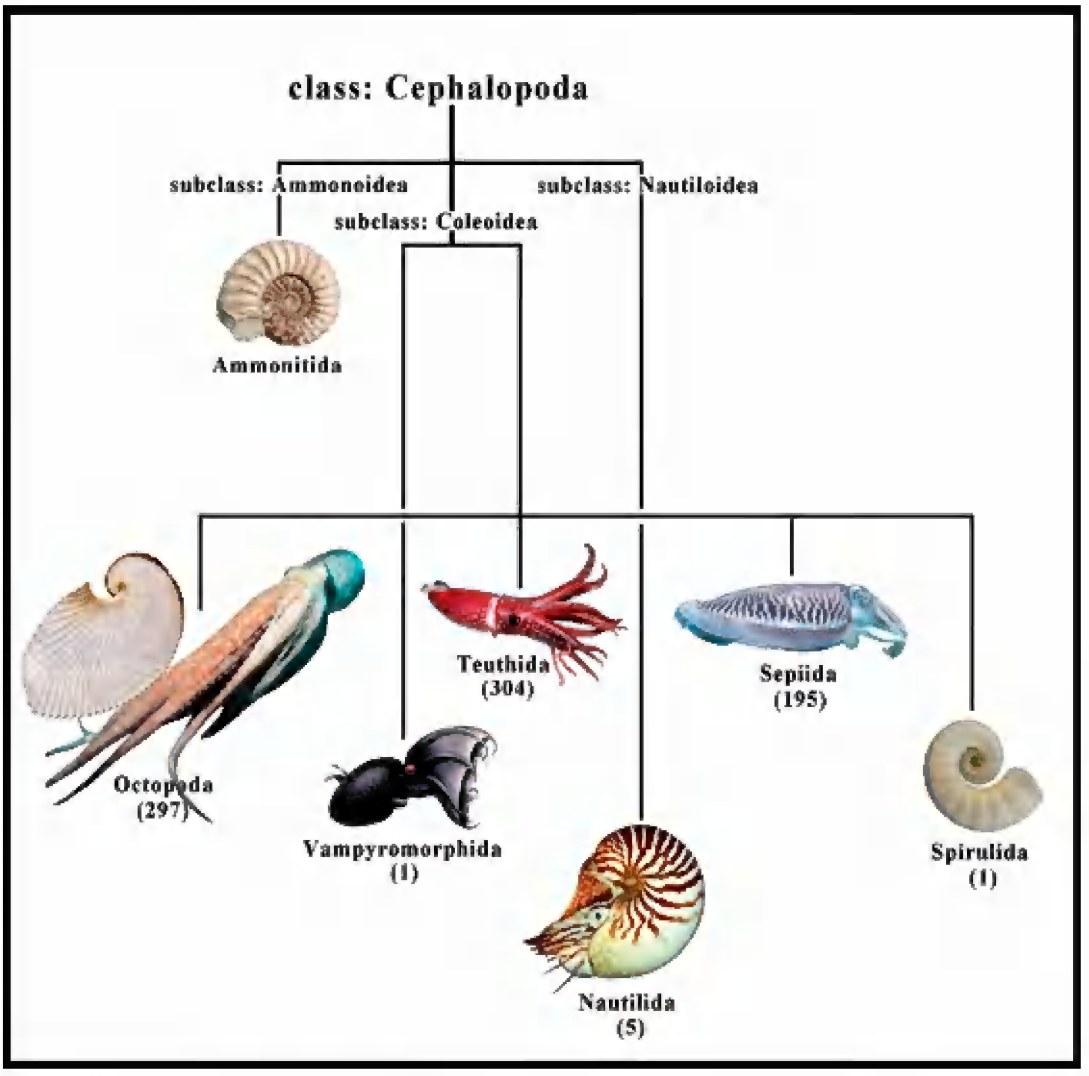
During the Devonian (419.2-358.9 MYA) ammonites first appeared, probably originating from bactritoid nautilids. Devonian nautilid genera numbered about 22 and are true nautilids in structure. The order Bactritida is considered ancestral to both the ammonites and the modern cephalopods. Despite appearances, ammonites, which died out during the Cretaceous-Paleogene extinction event (66 MYA, killing off 3/4 of all plant and animal species on earth), are no more closely related to extant nautilids than they are to extant cephalopods (octopus, squid, cuttlefish). All are in the class Cephalopoda, but the octopuses (order Octopoda), squid (order Teuthida), vampire squid (order Vampyromorphida), spirula (order Spirulida), cuttlefish (order Sepiida), and argonauts (order Octopoda) are all in the subclass Coleoidea, while the nautiluses (order Nautilida) are in the subclass Nautiloidea, and the ammonites are in the subclass Ammonoidea (with numerous orders and suborders).

Lituites lituus **Monfort, 1808, fossil ancestor of the nautilids. This fossil is from Hunan, China, but the genus was found worldwide.** ***Lituites*** **is an extinct nautiloid genus from the Middle Ordovician and was planospirally coiled on the juvenile portion of the shell but then extended the shell in a long, generally straight adult section. Image from Wikipedia.com.**

Nautilids declined somewhat during the late Devonian, but then flourished again during the Carboniferous

(358.9-298.9 MYA), with 16 families and some 75 genera. They decreased again during the Permian (298.9-252.2 MYA), and survived the Permian-Triassic extinction event (252 MYA), only to almost completely die out during the Triassic-Jurassic extinction event (201.3 MYA).

Only a single genus (*Cenoceras*), similar in appearance to modern nautilids, survived the Triassic-Jurassic extinction event. They flourished again through the Mesozoic (252-66 MYA), and survived (as previously noted) the Cretaceous-Paleogene extinction event (66 MYA). Several genera flourished throughout the Paleocene (66-56 MYA) and the Eocene (56-33.9 MYA), but out of maybe 10,000 nautilus species that thrived at different times in the world's oceans, only a single family (Nautilidae) survives today, with two genera: *Nautilus* Linnaeus, 1758 and *Allonautilus* Ward & Sanders, 1997 - (*allo* meaning different).



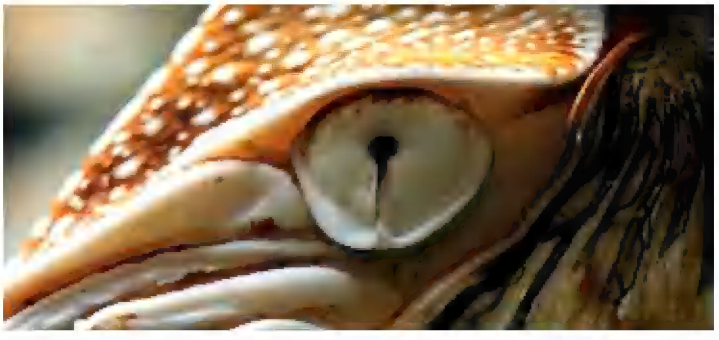
Notional tree demonstrating the relationships of various members (at the order level) of the class Cephalopoda. Note that extinct ammonites and extant nautiluses are in separate subclasses from all of the other cephalpods. All of the Recent cephalopods, EXCEPT the order Nautilida, belong to the subclass Coleoidea.

A fossil nautilus in the family Cymatoceratidae, probably the most common nautiloid family of the Cretaceous. The shell is noticibly similar to modern nautiloids, complete with a smooth surface and relatively flat septa.

Fossil ammonites, on the other hand, have heavily axially ridged shells. These particular specimens (identity unknown) have the outer shell replaced by iron pyrite.

An immature *N. pompilius* in a public aquarium. Once a rare sight, but relatively common today. Image from Wikipedia.com.

***Nautilus belauensis* viewed from the front, although the animal is traveling away from the viewer. Like other cephalopods, the hyponome or funnel of the nautilus provides a means for "jet" propulsion.**



Close up of the nautiloid simple pinhole eye (no lens). Image modified from Hans Hillewaert, Wikipedia.com.

The Life of the Nautilus

The chambered nautilus has a simple "pinhole" type eye (no lens) and about 90 tentacles that, unlike the octopoids, lack suckers. These tentacles are long and soft and can retract into a harder sheath. They use a ridged surface to stick to their prey and are known to have a strong grip (Kier, 1987). They have a pair of rhinophores (small appendages) located near each eye that are thought to function as scent detectors (Kier, 1987). Nautilids reproduce sexually (dimorphic) but there is little readily apparent sexual dimorphism in the shell (a slight shell size difference at maturity with males averaging about 13mm larger shell diameter was measured by Dunstan et al., 2011), although there are differences in the soft body parts (Ward, 1988; Griffin, 1900). Gravid female nautilus lay 10-20 eggs yearly (polycylic spawning) in shallow water, which take 12 months to hatch; contrary to most cephalopods that lay eggs once and die (terminal spawning) (Rocha et al., 2001). The young hatch with a complete shell with seven chambers, at a size of about 25mm (Grulke, 2016). The nautilus lifespan is estimated to be in excess of 20 years, but they do not reach sexual maturity until approximately 15 years. Their reproductive period is thus limited to 5+ years and although juvenile specimens were once objects of mystery, they were finally trapped at the same depths as feeding adults (Dunstan et al., 2011). The first hatchling ever observed was a captive at the Waikiki Aquarium, Hawaii, in 1985 (Grulke, 2016)

Nautilids are carnivorous and feed on both live prey and carrion. Because of this scavenging habit, they have been called an animal that will "eat anything that smells." (Ward, 1988) They typically spend daylight hours at depths from 300 to 1,000 feet and then ascend at night to feed in shallower water. This, along with their scavenging of dead and odiferous food items, has made them vulnerable to trapping (Ward, 1988).

The volume and density of liquid in the chambers of the nautilid shell are controlled by the animal and used to control its depth. A small tube called the siphuncle runs through the center of each septum and is used by the animal to control the amount of liquid and air in each chamber (Grulke, 2016). Typically, only the last chamber (most recently constructed) is full of liquid, the earlier chambers are emptied and full of air for buoyancy. A new chamber is not begun until the last chamber is half emptied of fluid (Ward, 1988). Chambers are added at a rate of one every 4-5 weeks (12-13 each year) when the animal is immature. This time interval increases as the nautilus ages until adult size when it adds a chamber only every 4-5 months. This growth rate is dependent upon water temperature, food availability, and shell condition. A damaged shell aperture takes precedence and no new septum is produced until the aperture damage is completely repaired (Ward, 1988). The outer edge of the aperture grows at between 0.13mm-0.25mm per day, again

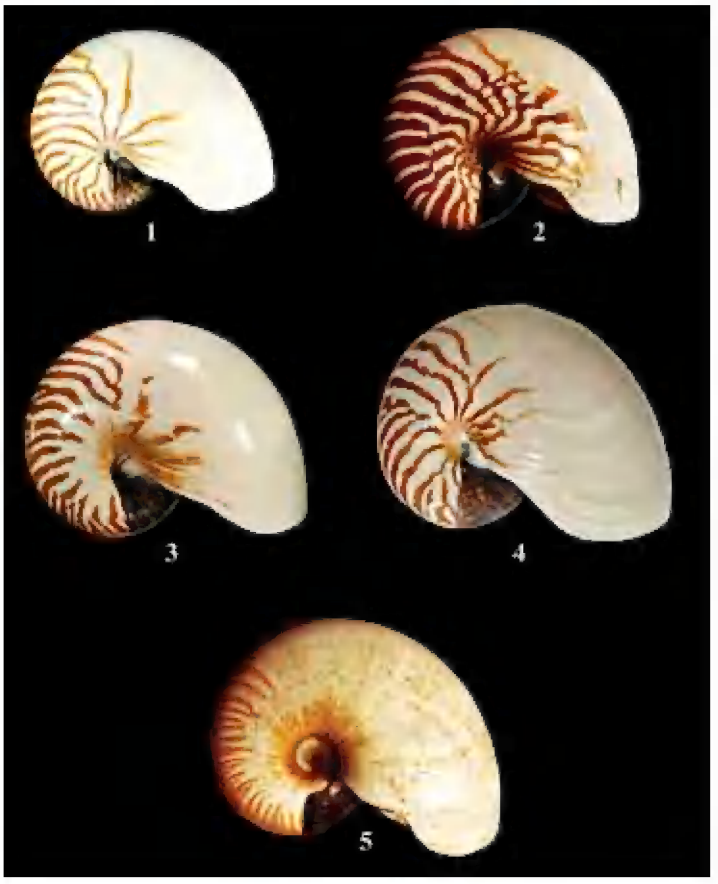
slowing at maturity. As the septum or chamber wall of the most recently constructed chamber is thickened with growth, the animal begins slowly removing the liquid. It is estimated that depths beyond 2000 feet would cause the shell to implode due to the water pressure (Ward, 1988).

All of this being said, there are actually a number of long-standing mysteries remaining about nautilids. One of the more intriguing begins with early descriptions of nautilid anatomy. In 1832, Sir Richard Owen[1] published a description of the anatomy of *Nautilus pompilius*. He provided several detailed plates with descriptive labels for the different parts of the animal's anatomy - except one unique organ that he was unable to identify (Owen, 1832). This was followed in 1841 by a publication on nautilus anatomy by Achille Valenciennes[2]. Again, the mystery organ remained so. Then came Jan van der Hoeven[3] in 1850 who found and described this same mystery organ. Part of the dilemma during this time was the scarcity of specimens. Only rarely did a returning ship offer up a usable *Nautilus* specimen, and it seldom came along with the soft animal parts. Eventually it was noticed that the mystery organ differed in male and female specimens and it was assumed to be reproductive in nature. This was not intuitive as the organ is located under the buccal mass (mouth parts) of the animal. It was thought the organ might be glandular in nature (another shot in the dark). The organ is divided into two primary structures in female specimens and called the organ of Valenciennes and the organ of Owen. In males, it is undivided and called the organ of van der Hoeven. Most recently, John M. Arnold in *Reproduction and Embryology of Nautilus* (2010) found spermatophores [sperm packets] lodged within the female Valenciennes organ.

Nautilus Species Today

Nautilids today are represented by three or up to nine species (and a few subspecies) – depending upon which author does the counting. According to the World Register of Marine Species (WoRMS, www.marinespecies.org) there are perhaps 80 named species in 3 genera: *Allonautilus*, *Eutrephoceras* & *Nautilus* (only 2 extant, *Eutrephoceras* is a fossil genus), with all but 5 being fossil species or *nomina dubia* (scientific name cannot be identified with a particular species).[4]

The common name 'chambered nautilus' usually refers to ***Nautilus pompilius*** Linnaeus, 1758, although it is often indiscriminately used for the other species of nautilus as well. Other common names for this species include: emperor nautilus, pearly nautilus, nautile flammé (French), and nautilo común (Spanish) (WoRMS, 2017). *Nautilus pompilius* is the most commonly encountered nautilus and ranges throughout the South Pacific, from Japan to the Great Barrier Reef, and from Indonesia to Fiji. It is the largest of the modern nautilids and can attain a shell size of 254mm (10 inches) (Quiquandon et al., 2015). The earliest fossil record of a modern nautilus species is from early Pleistocene deposits off Luzon, in the Philippines (Ryoji et al., 2008).



Extant nautilids

1. ***Nautilus belauensis*** **Saunders, 1981**
2. ***Nautilus macromphalus*** **G.B. Sowerby II, 1849**
3. ***Nautilus pompilius*** **Linnaeus, 1758 (type)[5]**
4. ***Nautilus stenomphalus*** **G.B. Sowerby II, 1849**
5. ***Allonautilus scrobiculatus*** **(Lightfoot, 1786) (type)**

[1] Sir Richard Owen (1804-1892) was a well-known and prolific British naturalist perhaps best known for coining the word *Dinosauria* ('terrible lizards,' from the Greek deinos, 'terrible', and sauros, 'lizard').

[2] Achille Valenciennes (1794–1865) was a respected French naturalist who published on various subjects, including: parasitology, herpetology, the taxonomy of mollusks and fish, and a range of systematic classifications, linking fossil and Recent species.

[3] Jan van der Hoeven (1801-1868) was a Dutch zoologist, naturalist, magazine publisher, and author. He considered himself a generalist with degrees in physics and medicine. He was one of the last to teach his classes in Latin.

[4] Both *Allonautilus perforatus* (Conrad, 1847) and *Nautilus repertus* Iredale, 1944, considered valid species by many shell dealers and collectors, are listed by WoRMS as *nomina dubia*.

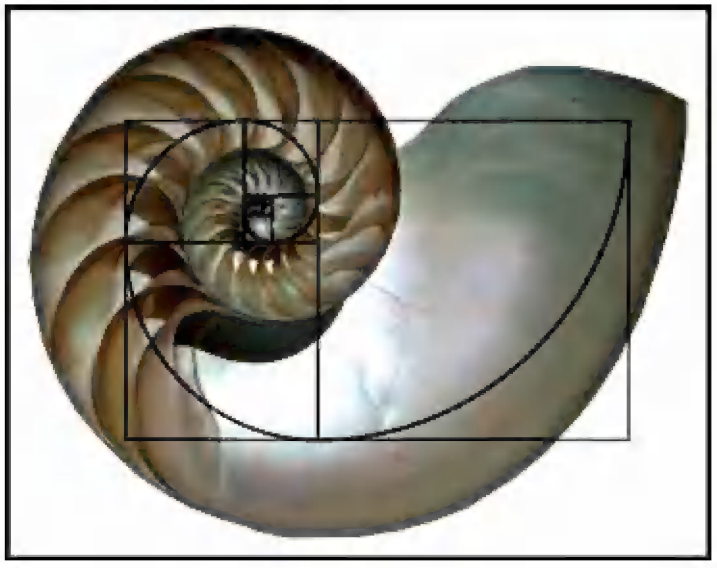
[5] *Nautilus pompilius suluensis* Habe & Okutani, 1988, a typically smaller version of *N. pompilius* found in the Sulu Sea, Philippines, is not presently recognized as a valid subspecies by WoRMS.

Allonautilus scrobiculatus was not sighted in the wild from 1986 to 2015. When Peter Ward of the University of Washington (with appointments in both the Department of Earth and Space Sciences and the Department of Biology) and his colleague Bruce Saunders from Bryn Mawr College sighted *Allonautilus scrobiculatus* off the coast of Ndrova Island in Papua New Guinea in 2015, only two other people in the world had ever recorded a live sighting of this rare species (Urton, 2015). This species grows in excess of 200mm and is found (rarely) in the waters off Papua New Guinea and the Solomon Islands.

Nautilus belauensis is known as the Palau nautilus because it is found in the waters off the Republic of Palau. It is similar in appearance to *Nautilus pompilius*, and shares with this species a closed umbilicus covered by a callus. Shell size exceeds 210mm and is second only to *Nautilus pompilius*. The *Nautilus belauensis* shell has a series of ridges, which, along with a differing radula, were enough to warrant separate species status.

Nautilus macromphalus, sometimes called the bellybutton nautilus, is native to the waters off New Caledonia and northeastern Australia. The shell has been measured at 180mm and it has an indented umbilicus without the covering callus found in *Nautilus pompilius* and *Nautilus belauensis*. It is otherwise similar in appearance to both of these species.

Nautilus stenomphalus is sometimes called the white-patch nautilus based on white markings around the umbilicus. It is found along the Great Barrier Reef. Like *Nautilus macromphalus*, this species has an indented umbilicus without a covering callus. The shell can attain 200mm in size, although it is usually smaller. In general the shell is lighter colored than the other species, but real differences are mostly in the soft body parts.



The "golden spiral" superimposed over a nautilus shell half. While the shape of the nautilus shell spiral is similar to the "golden spiral," they are not even a close match.

The Nautilus & Humankind

The shell growth pattern visible when the shell is sliced in half bilaterally has often been touted as an example of the "golden spiral." This is a logarithmic spiral (or equiangular spiral or growth spiral) based on the "golden ratio" of $r = ae^{b\theta}$. This mathematically precise expanding spiral (or the closely related Fibonacci spiral) has been 'found' any number of times in nature, but perhaps the most touted example is the nautilus shell. While the shell does display a logarithmic spiral, unlike the mathematical models, the ratio of the expanding nautilid shell changes as it grows. Measured nautilus ratios ranged from 1.24 to 1.43, while the "golden Ratio" is a fixed 1.6180339887 (Peterson, 2005; Fabio, 1999).

Perhaps the first description and illustration of nautilus was by Pierre Belon in 1553 in *De aquatilibus.*

According to Owen (1832) the nautilus was perhaps first described by Aristotle (384-322 BC), but questions remain as it is doubtful he saw a living specimen and the possibility exists he was describing a paper nautilus - *Argonauta*. Like the extinct ammonites, the *Argonauta* are more closely related to living octopus and squid than to the nautilids. According to Saunders & Landman (1989), the first description **and** illustration of nautilus was by Pierre Belon in 1553 in *De aquatilibus* and the first depiction of the nautilus animal was by Rumpf (better known by his later appellation Rumphius) in 1705.

Nautilus specimens eventually found their way to Europe in sufficient numbers where the shell became a popular item in many a curiosity cabinet. Some were inscribed in the manner of scrimshaw, others polished down (after an acid bath removed most of the outer shell) to the nacre layer. Both the polished shells and natural shells were then often mounted on stems to make drinking vessels. The shells were frequently further ornamented with gold or silver filigree.

Various polished and decorated nautilus shell cups. From left to right: a Dutch cup circa 1592, a German cup circa 1700s, an unknown origin circa 1700, and a Polish cup circa 1750.

The nautilus shell featured in many paintings from the 15th century. This is a portion of "Stillleben mit hohem goldenen Pokal" (Still life with a high golden cup) by Pieter Claesz (1597-1660). Image from Wikipedia.com.

"The Chambered Nautilus" by Andrew Wyeth (1917-2009) where the bed canopy mirrors the shape of the nautilus shell aperture. Image from Wikipedia.com.

The shell is also featured in other areas of art. Oliver Wendell Holmes, Sr. (1809-1894) wrote a poem titled "The Chambered Nautilus" in 1858 (his son was Oliver Wendell Holmes, Jr., who served many years as a US Supreme Court Justice). The first two lines read,

"This is the ship of pearl, which, poets feign,
Sails the unshadowed main,"

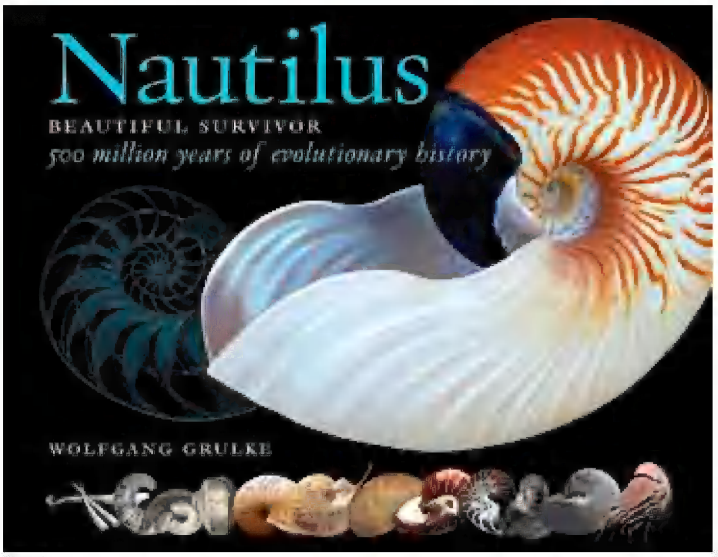
The American painter Andrew Wyeth (1917-2009) (perhaps most famous for his painting "Christina's World," also painted "The Chambered Nautilus," in which the bed canopy mirrors the shape of the nautilus shell aperture. Most of us grew up with the Jules Verne novel *Twenty Thousand Leagues Under the Sea*, or at least the Walt Disney movie interpretation with Captain Nemo's submarine *Nautilus*. There is also a Russian rock band named "Chambered Nautilus," and a search for "nautilus" on www.art.com will turn up dozens upon dozens of modern nautilus art prints.

The chambered nautilus remains a very popular shell and was commonly sold by specimen shell dealers as well as in tourist shops. It has been estimated that during the last few decades some 100,000 were harvested annually as a food item or for use of the shell nacre layer for inlay (mostly this later purpose). As stated by Dunstan et al. (2011), "The life history traits of late maturity (12–15 years), long gestation (10–12 months), and long life span (20+ years) combined with their low fecundity (10–20 eggs per year) makes nautilids particularly vulnerable to over-exploitation." They further state, "Recent studies on the Philippines fishery has shown declines in catch per unit effort of around 80% in 10–20 years, with relatively low effort by 3–4 local fishermen in each locality." The U.S. Fish and Wildlife Service Law Enforcement Management Information System (LEMIS) compiles data from U.S. wildlife declaration forms required for import or export of any wildlife, it indicates that between 2005 to 2010, over 789,000 chambered nautilus products were imported to the U.S. (Angelis, 2015). The numbers exported to China (where the shell nacre layer is a popular inlay item) and other far east countries was undoubtedly as high or higher. These different studies indicate heavy fishing of a population not yet understood and certainly not measured as to its sustainability. This prompted the U.S. to propose listing all nautilus species (both genera) in Appendix II of CITES (Convention on International Trade in Endangered Species of Fauna and Flora). The initial proposals for such a listing began in 2010 and were finally voted on and enacted in December 2016. Indonesia and India had previously listed *Nautilus pompilius* as a restricted species, but the new CITES restrictions apply to all nautilid species. Under Appendix II of CITES (not presently endangered but needs monitoring to ensure continued viability), any export of a nautilus species must be accompanied by a permit from the signatory country of origin.

A rare image of a living *Allonautilus scrobiculatus* photographed by Peter Ward off the coast of Papua New Guinea. The thick fleshy periostracum is clearly visible. Only a handful of people have seen this species alive. Image used with permission.

Known to feed on both live prey and carrion, nautilus are fairly easy to bait. Here *Nautilus pompilius* is feeding on a dead red snapper used as bait at 703 meters, the deepest recorded nautilus depth. Image from Dunstan, Andrew J., et al. (2011), accessed on Wikipedia.com.

***Nautilus macromphalus* at 15 meters, night dive, New Caledonia, photo by Pierre Sylvie, Wikipedia.com.**



A modern treatment of nautilus is *Nautilus: Beautiful Survivor* by Wolfgang Grulke (2016). Melds just enough science with stunning images to be thoroughly captivating. Well worth the money.

Saving the Nautilus

In all of this activity, if blame is laid, and it usually is, it is laid upon the shell trade. Trapping the animals to eat as a causal factor was not a consideration, nor was the use of the shell nacre for inlay work considered. Nautilids have forever captured the public's attention with the shape and coloring of the shell. Add to that the attempts to link the shell to numerical equations and even mystical events, and while not as cute as the sea otter or majestic as the blue whale, it does capture its share of publicity. Even the scientific press has statements calling the nautilus, "The world's most mathematically perfect marine species..." and "...the natural embodiment of the Fibonacci spiral..." (Platt, 2016). This same author goes on to talk about the importation of 1.7 million nautilus shells to the U.S. in the last 16 years, sold for between $15 and $200, in a trade that, "... has all but depleted many populations of these ancient animals." (Platt, 2016). Certainly the nautilus has been overfished, and hopefully this new CITES listing will provide some control without turning the shell into a museum piece only. Interestingly though, the nautilus fishing industry in the Philippines collapsed over 10 years ago (before any action to officially control nautilus fishing. Trapping nautilus is "...a difficult, time-consuming and expensive process..." (Grulke, 2016). The prices paid for the shells has remained low while expenses of up to $10,000 for a single expedition have put most fishermen out of business (Grulke, 2016). The new CITES restrictions (see Wolf & Lee, 2017: 17) and the fact that fishing pressures have already been severely curtailed, mean these wonders of nature have a chance - if you discount the fact that nautilids are extremely temperature sensitive and warming ocean temperatures may present more of a challenge than this cephalopod with a 500 million year history can survive.

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Thomas E. Eichhorst

North Carolina Shell Show – 14-15 October 2017

Despite having to change dates at the last minute due to Hurricane Irma, the annual North Carolina Shell Show was a resounding success. This year there was a new trophy presented, The Bosch Award, in memory of the late Dr. Donald T. and Eloise Bosch, longtime members of the NC club. Don was a pioneer in field collecting and shell research in Oman during his decades as a medical missionary and surgeon in that country. He is author and coauthor of a number of books on the shells of Oman and the Arabian Peninsula. He and his wife, Eloise and their three children David, Paul and Bonnie were active collector's in Oman and discovered many species of shells unknown to science. A number of them were named for members of the Bosch family, including the spectacular, *Punctacteon eloiseae*. Next year the winner of the Masters Trophy will also automatically be awarded the Bosch Trophy, an arrangement unique to the NC Shell Show.

John Timmerman won the COA Award for his display, "Mollusk Geometry." Using six large display cases (over 16 feet), John explained molluscan geometry, including logarithmic spirals, bilateral symmetry, asymmetry, fractal growth patterns, and fractal geometry.

The Master's Trophy (left) and the new Bosch Award (right) are shown here, both won by Jeannette Tysor & Ed Shuller for "Malacologists Important in Describing NC Marine Mollusks." These two awards will continue to be presented together at NC shell shows.

Scientific Trophy Winners:

Best Photography - scientific: Vicky Wall, "*Americoliva sayana*"

Best NC Collection: Brady Semmel, "Greetings From the Beaches of NC"

Alta VanLandingham Award for Best Self-Collected Exhibit: Jim & Linda Brunner, "Three Bay Sampler"

The Janet Durand Award: Irmgard Cate, "Shell Whale"

Best Fossil Exhibit: Ron Hill, "Calcite Replacing *Mercenaria permagna*"

Best Small Scientific Exhibit: Vicky Wall, "The Snail the Dinosaurs Saw"

Best Self-Collected Shell: Vicky Wall, "*Busycon carica*"

Best Shell In Show: Ron Hill, "*Austroharpa wilsoni*"

Dean & Dottie Weber Environmental Awareness Trophy: Brady Semmel, "Greetings from the Beaches of North Carolina"

The Bosch Award: Jeannette Tysor & Ed Shuller, "Malacologists Important in Describing NC Marine Mollusks"

DuPont Trophy: Doug Wolfe, "Mollusks and Shells From My Very Own Backyard"

Conchologists of America Award: John Timmerman, "Mollusk Geometry"

Arts & Crafts Trophy Winners:

Best Arts and Crafts Using Actual Shells: Rose Bunch, "untitled seahorse pulling carriage"

Best Arts and Crafts Depicting Shells: Peter Brimlow, "untitled embroidery"

Best Sailor's Valentine: Mary Brackman, "I'm Getting Married in the Morning"

Best Photography - Artistic: Ron Hill, "Banded Coral Shrimp on Yellow Sponge"

The venue for the shell show is the Cape Fear Museum, New Hanover Co., Wilmington, North Carolina.

Special Award Winners:

People's Choice Award: Doug Wolfe, "Mollusks and Shells From My very Own Backyard"

Judge's Special Award Ribbons: Mary Brackman: "First Attempt" - a Sailor's Valentine

Karlynn Morgan: "*Calliostoma* - Top This"

Phyllis Gray: "*Liguus*"

Trophies Not Awarded: Novice & Junior

Blue Ribbon Winners:

North Carolina Collection: Brady Semmel, "Greetings from the Beaches of North Carolina"

Regional Self-Collected: Jim & Linda Brunner, "Three Bay Sampler"

Regional Collection Any Source World-wide Self-Collected: Vicky Wall, "Adventures in the Western Atlantic"

Land Snails: Phyllis Gray, "*Liguus*"

Fossil Mollusks: Ron Hill, "Calcite Replacing *Mercenaria permagna*

Single Shell Self-Collected: Vicky Wall, *Busycon carica*

Single Shell Self-Collected: Amy Dick, *Scaphella junonia*

Single Shell Any Source: Ron Hill, *Austroharpa wilsoni*

Single Shell Any Source: Everett Long, *Panopea bitruncata*

Educational Collection: John Timmerman, "Mollusk Geometry"

Mollusk Natural History: Doug Wolfe, "Mollusks & Shells From My Own Back Yard"

Best Small Exhibit (10' or less): Vicky Wall, "The Snail the Dinosaurs Saw"

Beach Collected Shells: Brady Semmel, "Greetings from the Beaches of North Carolina"

Best of the Best (Masters): Jeannette Tysor & Ed Shuller, "Malacologists Important in Describing NC Marine Mollusks"

Shell Photography (scientific): Vicky Wall, *Americoliva sayana*

Shell Photography (artistic): Ron Hill, "Banded Coral Shrimp on Yellow Vase Sponge"

Mike's nautilus

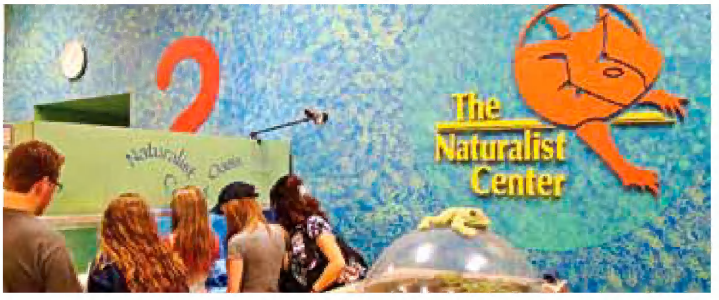
Tom Eichhorst

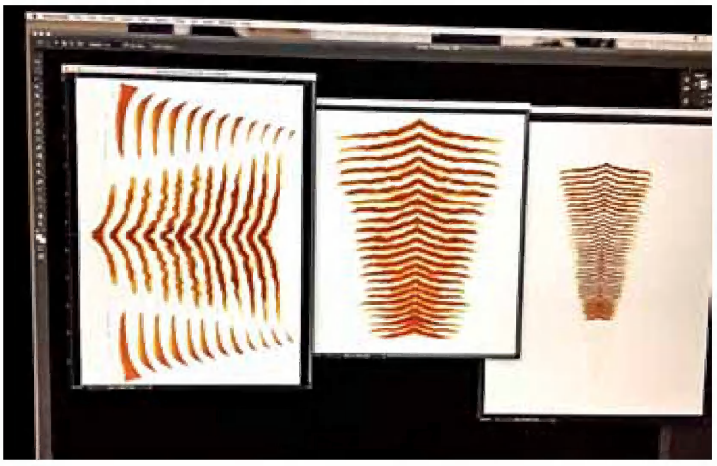
A friend of mine, in fact a "shell buddy," (the best kind of friend) is the Naturalist Center/School Programs Educator for the New Mexico Museum of Natural History in Albuquerque, New Mexico. His name is Michael Sanchez, and aside from running The Naturalist Center for the museum, a place where visitors of all ages can learn about the natural world of New Mexico, he is an artist - but first, The Naturalist Center. This is a spacious area the museum set aside for one-on-one contact with the natural world. Mike ensures the rooms are stocked with turtles, snakes, fish, spiders, frogs, minerals, nests, insects, fully articulated skeletons, leaves, lichens, etc., and even sea shells - all available (where and when appropriate) for observing and, most importantly, handling. Mike and his hard working team of volunteers know their stuff and this area of the museum is always packed. With modern kids seemingly further and further removed from the natural world, this place is truly special. So what about the artist part?

Mike has demonstrated his artistic talents in any number of ways, but of interest here is when those talents intersect the world of shells. He has provided shell art for *American Conchologist* (*Lambis chiragra* (Linnaeus, 1758) that was a back cover and now hangs in my house), but most of his artistic endeavors end up supplementing the material in The Naturalist Center. Some of the art, however, is for his personal use and enjoyment. He has constructed rare volute shells out of resin that are impossible to tell from the real specimen without picking his copy up in hand and closely examining the aperture. When I was preparing the article on the chambered nautilus, I remembered another bit of art he had done, this time with paper. Working with a computer to generate and print the images, scissors, glue, and a lot of imagination, Mike constructed notional nautiluses. Remember, he works with fossils a lot, so these are conceptual fossil nautiluses. The end result weighs what a single sheet of paper weighs, yet is strong enough that he had no problem letting my four-year-old granddaughter examine the finished product.

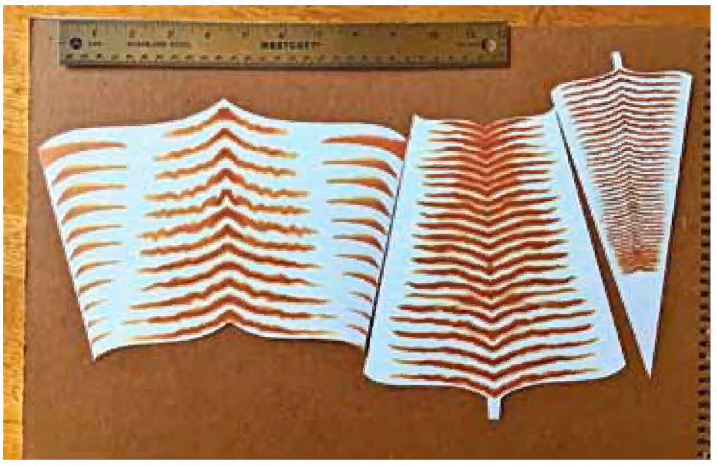
On the next page are a few images demonstrating the process of constructing a paper nautilus, not to be confused with that other paper nautilus, the *Argonauta*. This is certainly not a tutorial, but I thought the process was interesting enough to pass on to the readers of *American Conchologist*. The back cover shows the finished product.

Tom Eichhorst



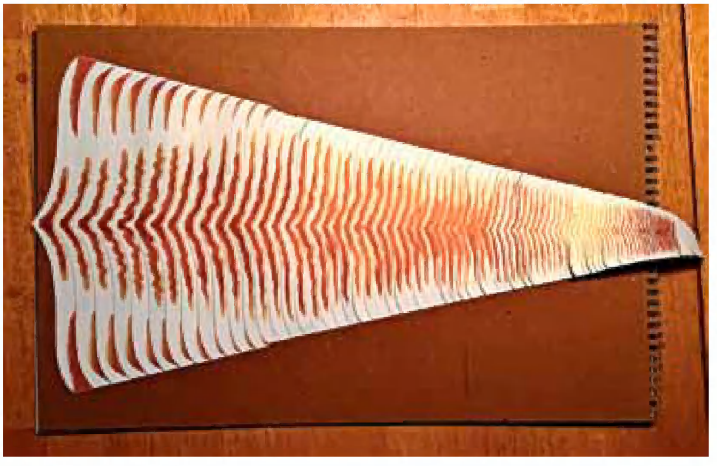


1. First the images are created (lots of trial and error) on Paint Shop and then printed on three sheets of paper.



2. Next the images are cut out in a predetermined shape - to facilitate rolling into a nautiloid coil. The central tab is used to glue the pieces together.

3. Here the three pieces are glued together in a triangular shape and cut in between the brown stripes with an Exacto-knife.



4. The glued and sliced final product is laid out for rolling and gluing (it will have to be turned over to roll it up).

5. The shell is formed by rolling the shape from the narrow portion towards the wider portion. Individual slats are sparingly glued together as they are rolled.

6. The finished shell. Now it just needs the animal inserted. Personally, I was happy with the shell, but Mike went ahead and added the animal - see back cover.